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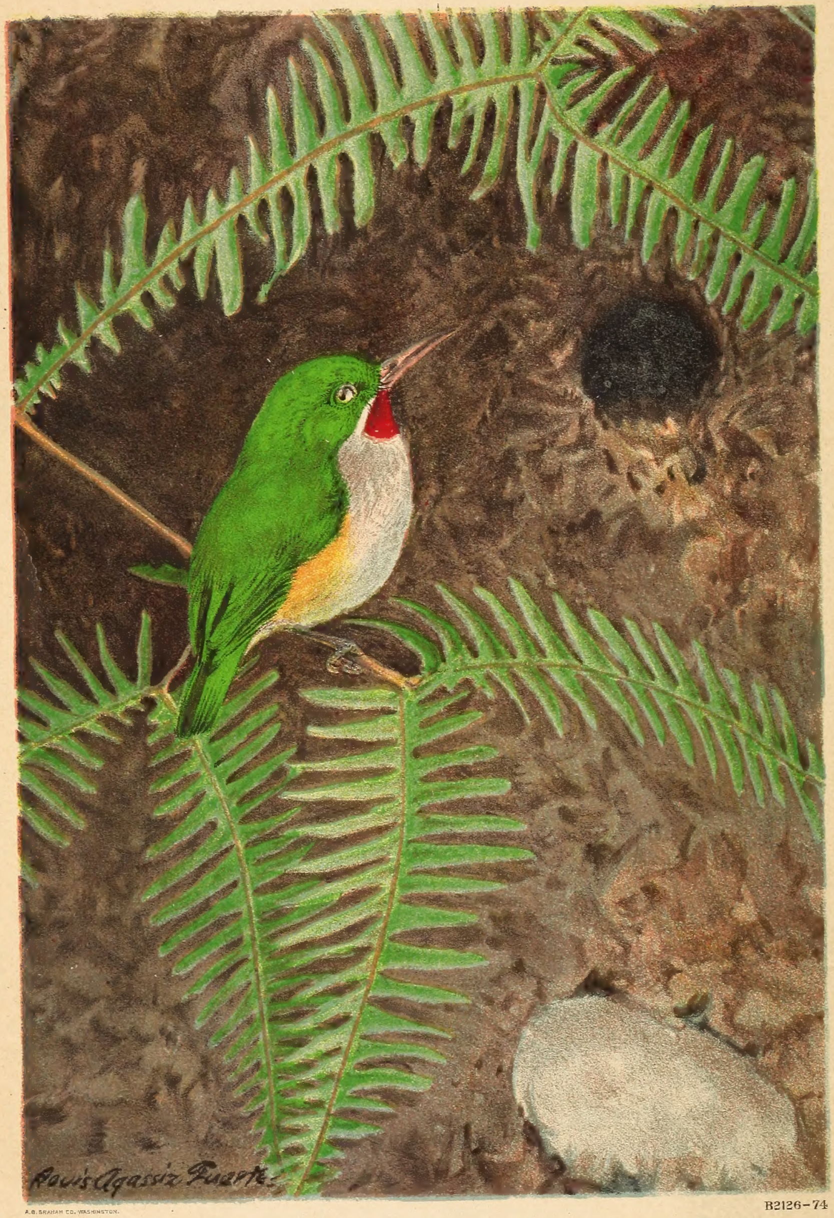
Louis Agassiz Fuertes

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PORTO RICAN TODY OR SAN PEDRITO (TODUS MEXICANUS). SLIGHTLY REDUCED.

UNITED STATES DEPARTMENT OF AGRICULTURE

BULLETIN No. 326

Contribution from the Bureau of Biological Survey
HENRY W. HENSHAW, Chief

Washington, D. C. PROFESSIONAL PAPER March 24, 1916

BIRDS OF PORTO RICO.

By Alex Wetmore, *Assistant Biologist.*

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INTRODUCTION.

The following report on the birds of Porto Rico is the result of investigations made by the Biological Survey in cooperation with the government of the island. Because of the damage to crops by insect pests and the resulting pecuniary loss, the Board of Commissioners of Agriculture of the island in 1911 requested the aid of the United States Department of Agriculture in an effort to determine the relations of the island birds to the insect fauna. Little was actually known concerning the economic status of many species of birds, and that little was founded chiefly upon field observation, a method not without value, but one leading frequently to error.

In Porto Rico the population is engaged primarily in agricultural pursuits, the production of sugar, tobacco, coffee, and fruits greatly overshadowing other lines of industrial activity. Under the methods of intensive agriculture now employed many insects, including the mole cricket, the cane root-boring weevil, the May beetle, and others, are very destructive. Various methods have been employed in attempting to check the ravages of these insects, and planters are beginning to recognize that the island birds are of enormous importance in combating them. In the rural districts, however, the country people, ignorant of the services birds render, ruthlessly plunder nests and kill small birds wantonly or for food. In addition, several species of great economic importance are classed as game birds and are killed without regard to season or their value as insect destroyers.

Accurate knowledge in regard to the economic status and relative abundance of the island birds was lacking, and there was little upon which to base protective legislation. Knowledge was lacking also in regard to practicable methods for increasing useful resident species; and, finally, as to the desirability of introducing exotic insectivorous or other birds.

Investigations were begun in December, 1911, and continuous field work was carried on until September, 1912, permitting nine months of consecutive observation. All the principal regions of Porto Rico were visited, short trips were made to the adjacent islands of Vieques and Culebra, and four days were spent on Desecheo Island, in Mona Passage. As a result of this field work more than 2,200 stomachs of birds collected at all seasons were available for laboratory study and investigation, about 2,000 of which were collected by the writer and the remainder acquired from other sources. The examinations and results have additional importance as representing the first extended work of the kind carried on within the tropical regions of the Western Hemisphere.

ITINERARY.

The field work in Porto Rico covered the entire island and the more important off-lying islands, with the exception of Mona. Effort was made to visit the main agricultural areas at different seasons in order to study bird life in its relation to changing conditions of season and cultivation incident to growth. Original conditions were studied so far as possible by exploring the small areas of natural forest still remaining.

Beginning at San Juan, the capital city, on December 13, 1911, work was continued on the island until September 11, 1912, as follows (see Pl. II):

San Juan, Dec. 13–15.
Río Piedras, Dec. 16–28.
Fajardo, Dec. 29–30.
Río Piedras, Dec. 31–Jan. 4.
Caguas, Jan. 5–14.
Cayey, Jan. 15–25.
Aibonito, Jan. 26–Feb. 4.
Aibonito to Río Piedras, Feb. 5.
San Juan, Feb. 6–8.
Mameyes, Feb. 9–Mar. 1.
Hacienda Catalina, Mar. 2–12.
Mameyes, Mar. 13–14.
San Juan, Mar. 15.
Vieques Island, Mar. 16–Apr. 4.
Culebra Island, Apr. 5–22.
  Louis Peña, or Southwest Cay, Apr. 11.
  Culebrita Island, Apr. 15.
Vieques Island, Apr. 23.
Naguabo, Apr. 24.
San Juan, Apr. 25.
Salinas, Apr. 26–May 2.
Yabucoa, May 3–11.
Patillas, May 12–14.
Ponce, May 15.
Yauco, May 16–28.
Maricao, May 29–June 5.
Mayagüez, June 6.
Añasco, June 7–8.
Aguadilla, June 9–12.
Desecheo Island, June 13–16.
Aguadilla, June 17.
Lares, June 18–July 1.
Quebradillas, July 2–6.
Manatí, July 7–11.
Ciales, July 12–18.
Bayamón, July 19–25.
Comerio, July 26–31.
Bayamón, Aug. 1.
Toa Alta, Aug. 2.
Utuado, Aug. 3–9.
Adjuntas, Aug. 10–16.
Juana Diaz, Aug. 17–22.
Ponce, Aug. 23.
Cabo Rojo, Aug. 24–31.
Cabo Rojo to Caguas, Sept. 1–2.
Humacao, Sept. 3–9.
San Juan, Sept. 10–11.

PHYSIOGRAPHY OF PORTO RICO.

Approximately 100 miles long by 40 broad, Porto Rico, though the smallest of the Greater Antilles, possesses considerable diversity of surface. From Mayagüez to Humacao extends a mountain chain known in the west as the Cordillera Central and east of Aibonito as the Sierra de Cayey. Northeast of the latter runs the Sierra de Luquillo, rising in El Yunque to 3,406 feet above sea level, the highest point on the island. From this central divide the descent to the coast is abrupt and much broken by series of hills cut by deep ravines. As the range is nearer the south coast the larger streams flow to the north. A low divide separates the northeastern mountain mass from the main range, and others, higher, offer passage across the island at several points.

The coastal region is formed by a narrow plain extending around the island, though in a few places the hills approach the sea abruptly. In this plain, conical limestone hills rising to sharp points are frequent, and inland is found a rough limestone foothill region. Mangrove swamps and shallow lagoons, many of which have been drained of late years, are found near the mouths of rivers on the north and west coasts, and at Guánica is a considerable body of fresh water with surrounding marshes.

Governed by the prevailing northeast trade winds, rainfall varies greatly in different localities. For the entire island the annual average precipitation amounts to 77.3 inches. The south coast is relatively dry, the greatest precipitation occurring on the north side. The maximum volume of rain falls in the northeast on El Yunque and about its base, where the annual average is 135 (maximum 169) inches. The northern slopes of the central mountain range as a whole secure the greatest quantity. Along the northwest coast from Isabela to Camuy is an area of small precipitation, at times very dry, while the south coast from Cabo Rojo to Guayama is almost universally so, the annual average being 40 inches or less. The rainy and dry seasons are not well defined, rains occurring throughout the year. The minimum rainfall is in February, while the maximum occurs from May to November, varying with the locality.

Vieques and Culebra Islands are comparatively low, with many rounded hills. Lagoons are found near the sea, though they are frequently dry. The general appearance of the islands is that of the south coast of Porto Rico. Desecheo Island in Mona Passage is smaller, and rises in two conical hills from the sea to an altitude of about 400 feet. A rough path leads up and down over the rocks above the beach, but inland the brush is almost impassable. Mona Island, as described by Bowdish (MS.), is 7 miles long by 3 or 4 wide and is rather barren. It slopes gradually from the higher north end to the south and, though elevated, is comparatively level. Caves are numerous in the face of the cliffs above the sea. At the southwest is a comparatively low strip of ground. Both Mona and Desecheo are dry and arid.

BIRD LIFE.

As compared with corresponding latitudes in Central America and Mexico, the avifauna of the Greater Antilles is very poor in the number of species, as is usual in island groups distant from continental regions. Porto Rico, smallest of the chain to which it belongs, is also least in number of forms of bird life, a fact explained by its comparative isolation and remoteness from evolutionary centers in the large land areas. Thus far 162 species and subspecies are recorded for the region, including Porto Rico, Mona, Desecheo, and the American possessions in the Virgin Group, while 16 others are included as hypothetical. A number of forms recorded by Ledru (1810) are disregarded as wholly improbable. Of the bona fide forms, 94 breed on the islands, 63 are visitants during migration, and 5 species, perhaps residents at one time, may be called accidental. Among the resident species 25 are peculiar to the region under discussion (24 on Porto Rico and 1 on Mona Island) and 3, though breeding there, are absent during part of the winter season. Six have been introduced from foreign countries and are now feral or have been within recent years.

Birds are generally more abundant on the coastal plain than inland, the swamp-loving species and water birds being confined chiefly to the neighborhood of the sea. The range of a number of Greater Antillean birds finds its most eastern extension in Porto Rico, and a few forms come up through the Lesser Antilles to Vieques Island, but go no farther. Mona and Desecheo, isolated peaks on the ocean floor, are populated almost entirely by sea birds, few land birds occurring there.

On the average, about 30 species are found in reasonable numbers during summer in almost any inland locality on Porto Rico, and a few more North American migrants are added in winter. Near the coast these numbers are augmented somewhat by water birds. The species are few, but individuals, especially of dominant forms, are plentiful, though often overlooked by a casual observer because of their retiring habits and secretiveness. Certain areas are seemingly destitute of bird life, but to show that birds are more numerous in Porto Rico than is commonly supposed, two censuses were taken during the breeding season, in which accurate count was made of the number of species and individuals of each seen. On May 24, at Yauco, 391 birds belonging to 35 species were listed in four hours in traversing a distance of 5 miles through cane fields, open and brush-filled pastures, and areas given over to small crops. Twenty-six of these species, comprising 252 individuals, belonged to beneficial forms of economic importance, and the remainder, 139 individuals of 9 species, were neutral forms, harmless, and inoffensive. Near Lares, in the interior, a census taken on June 28 covered an area of approximately the same size, but one of coffee plantations and small farms. Here 335 individuals of 27 species were seen; of these, 21 species (300 individuals) were beneficial and 6 species (35 individuals) were neutral. These results compare very favorably with censuses taken on similar cultivated areas in eastern United States during the breeding season. The relative importance of birds to the major agricultural interests of the island may best be understood by a consideration of species commonly found in cane fields, coffee plantations, and citrus groves.

BIRDS FOUND IN CANE FIELDS.

Cane fields cover the larger part of the arable lowlands of the island and in favorable localities extend over the foothills and higher slopes. As these fields are cultivated intensively and offer no safe nesting sites unless bordered by palms or other trees, they are used only as feeding grounds by birds coming in from near by where cover and security are to be found. The fields are frequented chiefly when being plowed or cultivated, as grubs, mole crickets, and other insects are then readily accessible to the birds. When the cane grows higher, birds are seen in the roads, which cut the fields into squares, and in the dense tangle of stalks some species find convenient shelter. No bird harms the cane in any way, and those that are not directly beneficial by destroying insects, and to a less extent weed seeds, are neutral and do no damage. During most of the year, only adult insects of the important pests are available, immature forms being exposed mainly at plowing time. To see a flock of blackbirds at that season following closely in the furrows behind the plow, eating greedily and carrying food to their young, emphasizes their value. Following is a list of birds found regularly in the cane fields; a number that occur more or less casually are not included:

Martinete (*Butorides v. cubanus*).
Garza (*Florida c. cœrulescens*).
Falcón (*Falco s. loquacula*).
Rolita (*Chæmepelia p. trochila*).
Tórtola (*Zenaida z. lucida*).
Judío (*Crotophaga ani*).
Zumbador (*Anthracothorax aurulentus*).
Pitirre (*Tyrannus d. dominicensis*).
Golondrina (*Petrochelidon f. pœciloma*).
Golondrina (*Progne dominicensis*).
Ruiseñor (*Mimus p. orpheus*).
Pizpita dorada (*Seiurus aurocapillus*).
Reinita (*Cœreba portoricensis*).
Veterano (*Amandava melpoda*).
Mariquita (*Agelaius xanthomus*).
Mozambique (*Holoquiscalus brachypterus*).
Chamorro bicolor (*Tiaris b. omissa*).
Gorrión (*Tiaris o. bryanti*).

The same species frequent tobacco fields and areas of small farms, where legumes, maize, and other small crops are grown.

The smaller shorebirds are often found in migration in low wet fields, and other birds frequently venture into the borders of the crop before it is cut.

BIRDS FOUND IN COFFEE PLANTATIONS.

The extensive forests which formerly covered Porto Rico have been replaced in the interior to a great extent by coffee plantations; only small sections of second growth are left, and these diminish steadily year by year. The most extensive region devoted to coffee culture is in the western end of the island around Maricao and Adjuntas, but large fincas occur through the hills of the entire island and in a few places on level ground near the coast. The low coffee trees and attendant shade trees covering them do not seem to supply all the needs of the original forest-dwelling species, though many have adapted themselves readily to the changed conditions. Parrots, crows, and courlans have almost disappeared, and other species, greatly reduced in numbers, are restricted in their range to the dense forest growths remaining on inaccessible hills or on land of little value.

In the coffee plantations changing seasons offer little variation, except in the flowering and the gradual maturing of the coffee berries. Once, or perhaps twice, in the year the ground is cleared somewhat and the trees trimmed, and later, pickers come through gathering the crop; but during most of the year, except near the paths leading through the fincas, there is little human interference with the wild life found there. Insects, many of them injurious, are common, and make many a meal for the birds which harbor in the plantations; while berries, seeds, and wild fruits in their season offer a superabundant supply to the birds which prefer vegetable food. It is claimed that birds do some damage to ripening coffee berries by eating the sweet pulp surrounding the inner berry, but as yet this charge is unsubstantiated. The damage is done apparently by rats, which, being unseen, are not suspected, the birds getting the credit for the misdeeds of the rodents. Many species of birds, as woodpeckers, flycatchers, cuckoos, and others, are of great benefit here, and only rarely can any of the forms found in the coffee district be called injurious. In the absence of forests, these plantations serve as centers of distribution for birds, and so aid in keeping at a maximum the number of individuals in each section, for from their shelters the birds spread into the more open hedgerows and scattered tree growths of the surrounding country. The following list enumerates the more common of the avian residents of coffee plantations, and includes several northern forms that winter here in numbers sufficient to render them of economic importance:

Falcón (*Falco s. loquacula*).
Perdiz (*Geotrygon montana*).
Paloma turca (*Columba squamosa*).
Pajaro bobo (*Coccyzus m. nesiotes*).
Pajaro bobo major (*Saurothera vieilloti*).
Carpintero (*Melanerpes portoricensis*).
San Pedrito (*Todus mexicanus*).
Múcaro (*Gymnasio n. nudipes*).
Zumbadorcito (*Chlorostilbon maugæi*).
Zumbador verde (*Anthracothorax viridis*).
Clérigo (*Tolmarchus taylori*).
Juí (*Myiarchus antillarum*).
Bobito (*Blacicus blancoi*).
Golondrina (*Petrochelidon f. pœciloma*).
Zorzal (*Mimocichla a. portoricensis*).
Julian chiví (*Vireo latimeri*).
Bien-te-veo (*Vireosylva c. calidris*).
Candelita (*Setophaga ruticilla*).
Bijirita adelaida (*Dendroica adelaidæ*).
Bijirita aplomada (*Dendroica c. cærulescens*).
Pecho de oro (*Compsothlypis a. usneæ.*)
Bijirita trepadora (*Mniotilta varia*).
Reinita (*Cœreba portoricensis*).
Calandra (*Icterus portoricensis*).
Verdoso (*Nesospingus speculiferus*) (of local distribution).
Reina mora (*Spindalis portoricensis*).
Jilguero (*Tanagra sclateri*).
Gallito (*Loxigilla portoricensis*).
Chamorro bicolor (*Tiaris b. omissa*).

BIRDS FREQUENTING CITRUS GROVES.

The citrus groves of Porto Rico are growing steadily in extent, and it is of vital interest to the growers that birds accept the new conditions brought about and make the orchards regular feeding grounds. Rumors that a bird injured the fruit by puncturing it could not be substantiated. A few birds, as the oriole and spindalis, were seen eating oranges, but in every case they attacked only wild fruit that was dead ripe and beginning to soften. The honey creeper, too, came to sip the juice when the oranges were once broken open. Quail-doves pecked open the rotting sweet oranges for the seeds as they lay on the ground, but no birds were found attacking sound fruit in the groves. Insectivorous species in feeding about the trees destroy innumerable pests and assist in keeping the trees clean. The open spaces and shady perches found are attractive to a number of birds, and when nests are built in the orchards care should be taken not to disturb them. Many birds now finding shelter in brushy areas surrounding the groves resort to the orchards to feed during the day. The following list of birds observed mainly in the Bayamón district and about Río Piedras includes some of the most beneficial species on the island:

Falcón (*Falco s. loquacula*).
Playero (*Oxyechus v. rubidus*).
Rolita (*Chæmepelia p. trochila*).
Tórtola (*Zenaida z. lucida*).
Judío (*Crotophaga ani*).
Zumbador (*Anthracothorax aurulentus*).
Pitirre (*Tyrannus d. dominicensis*).
Clérigo (*Tolmarchus taylori*).
Juí (*Myiarchus antillarum*).
Golondrina (*Petrochelidon f. pœciloma*).
Ruiseñor (*Mimus p. orpheus*).
Julian chiví (*Vireo latimeri*).
Bien-te-veo (*Vireosylva c. calidris*).
Bijirita galana (*Dendroica discolor*).
Bijirita adelaida (*Dendroica adelaidæ*).
Pecho de oro (*Compsothlypis a. usneæ*).
Bijirita trepadora (*Mniotilta varia*).
Reinita (*Cœreba portoricensis*).
Diablito (*Spermestes cucullata*).
Mariquita (*Agelaius xanthomus*).
Calandra (*Icterus portoricensis*).
Mozambique (*Holoquiscalus brachypterus*).
Reina mora (*Spindalis portoricensis*).
Chamorro bicolor (*Tiaris b. omissa*).
Gorrión (*Tiaris o. bryanti*).

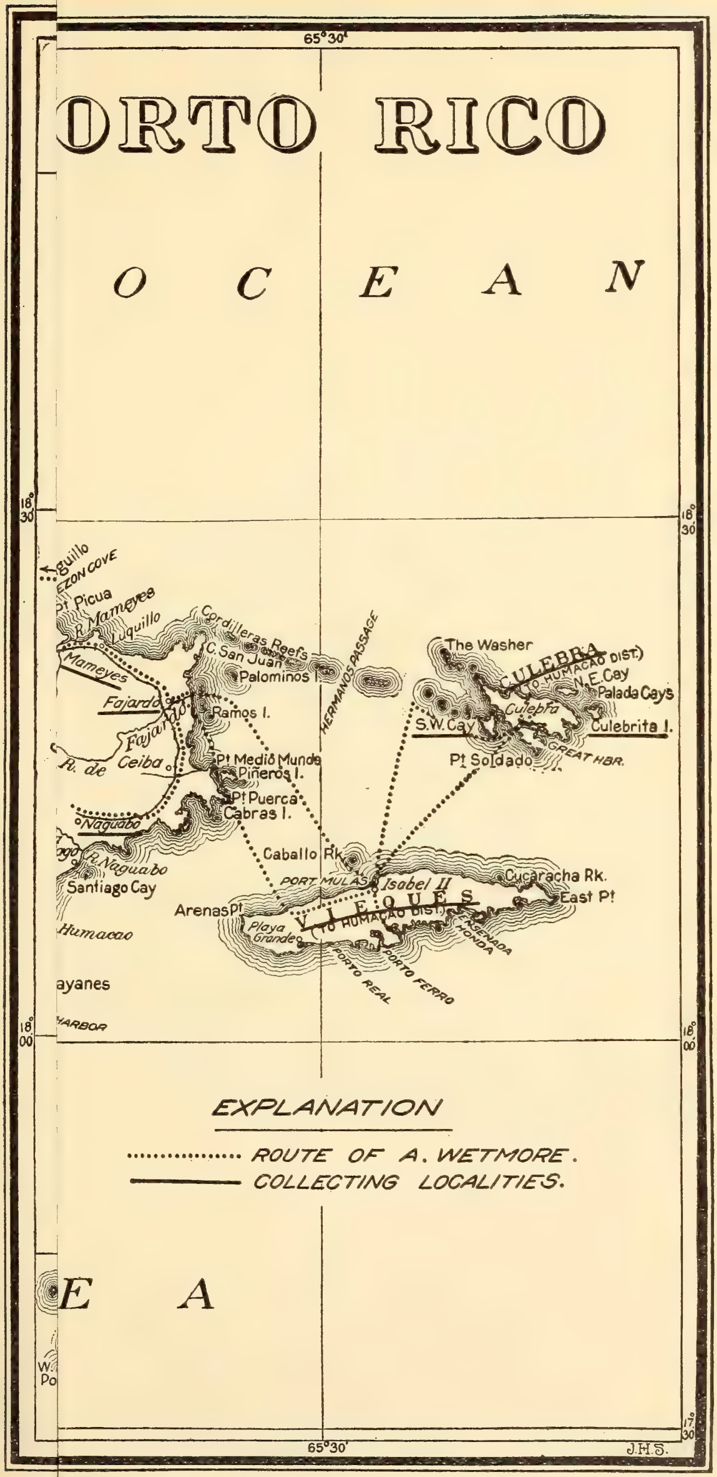
ECONOMIC CONSIDERATIONS.

The food of the birds considered in this report does not exhibit the seasonal variation so noticeable in the case of birds of more northern latitudes. The food of resident birds in the United States shows in many instances a predominance of insects in the warmer season and of vegetable matter in the winter months, though many specialized forms may feed on one or the other throughout the year. In Porto Rico, because of the even temperature and slight climatic changes, birds are not forced to vary their diet; consequently the percentages of animal and vegetable food are relatively stable from month to month, and a bird is vegetarian or predacious, or both, throughout the year, according to its natural bent. Young birds of partially insectivorous species, when abandoned by their parents and left to their own resources, often feed largely upon berries and other vegetable matter, but as they become more adept secure the same kind of food as their parents.

Among resident forms, birds belonging to families which in temperate latitudes feed almost entirely on insects, eat great quantities of vegetable matter. This is especially noticeable among flycatchers. Of the five forms inhabiting these islands only one, the bobito (*Blacicus blancoi*), is truly insectivorous; the others, all birds of fair size, consume many more berries and wild fruits than do their representative forms in the north; and one, the elainea (*Elainea m. martinica*), is almost entirely vegetarian. Small wild fruits and berries abound at all seasons, offering an easily obtainable food supply. Some North American migrants, predacious in their northern homes, here follow the example of native forms and feast on the bountiful crop of berries before them.

In Porto Rico, birds which feed on wild fruits almost entirely, as the spindalis, are not at all injurious. The coffee berry, with its sweet outer covering, is the only important small cultivated fruit, and from the evidence available it is left untouched by birds, though two species are locally believed to eat it. The distribution of seeds of wild fruits can not be charged against the birds, as none of the plants or shrubs disseminated are of importance as noxious species. Small grains are grown in comparatively small areas and are little eaten by birds. The few kernels of corn taken by blackbirds amount to nothing, and none of the seed-eating pigeons examined had taken grain.

Among the common birds found in Porto Rico none, fortunately, may be called wholly pernicious. The small bird-eating *Accipiter* found at Maricao is certainly injurious, and its larger relative, the red-tailed hawk, is troublesome when it acquires a taste for poultry; but some species, while to a certain extent destructive, make up for their damage in other ways. Several birds eat large numbers of lizards and tree toads, seemingly without reducing their numbers, as these creatures are to all appearances as abundant as is possible.


ORTO RICO
O C E A N
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guillo
EZON COVE
Pt Picua
R. Mameyes
Luquillo
Mameyes
Cordilleras Reefs
C. San Juan
Palominos I.
Fajardo
Fajardo
Ramos I.
HERMANOS PASSAGE
R. de
Ceiba
Pt Medio Mundo
Piñeros I.
Pt Puerca
Cabras I.
Naguabo
R. Naguabo
Santiago Cay
Humacao
ayanes
HARBOR
Caballo Rk.
PORT MULAS
Isabel II
VIEQUES
(TO HUMACAO DIST.)
Arenas Pt
Playa Grande
PORTO REAL
PORTO FERRO
ENSENADA HONDA
Cucaracha Rk.
East Pt
The Washer
CULEBRA
(TO HUMACAO DIST.)
N.E. Cay
Palada Cays
Culebra
S.W. Cay
Culebrita I.
GREAT HBR.
Pt Soldado
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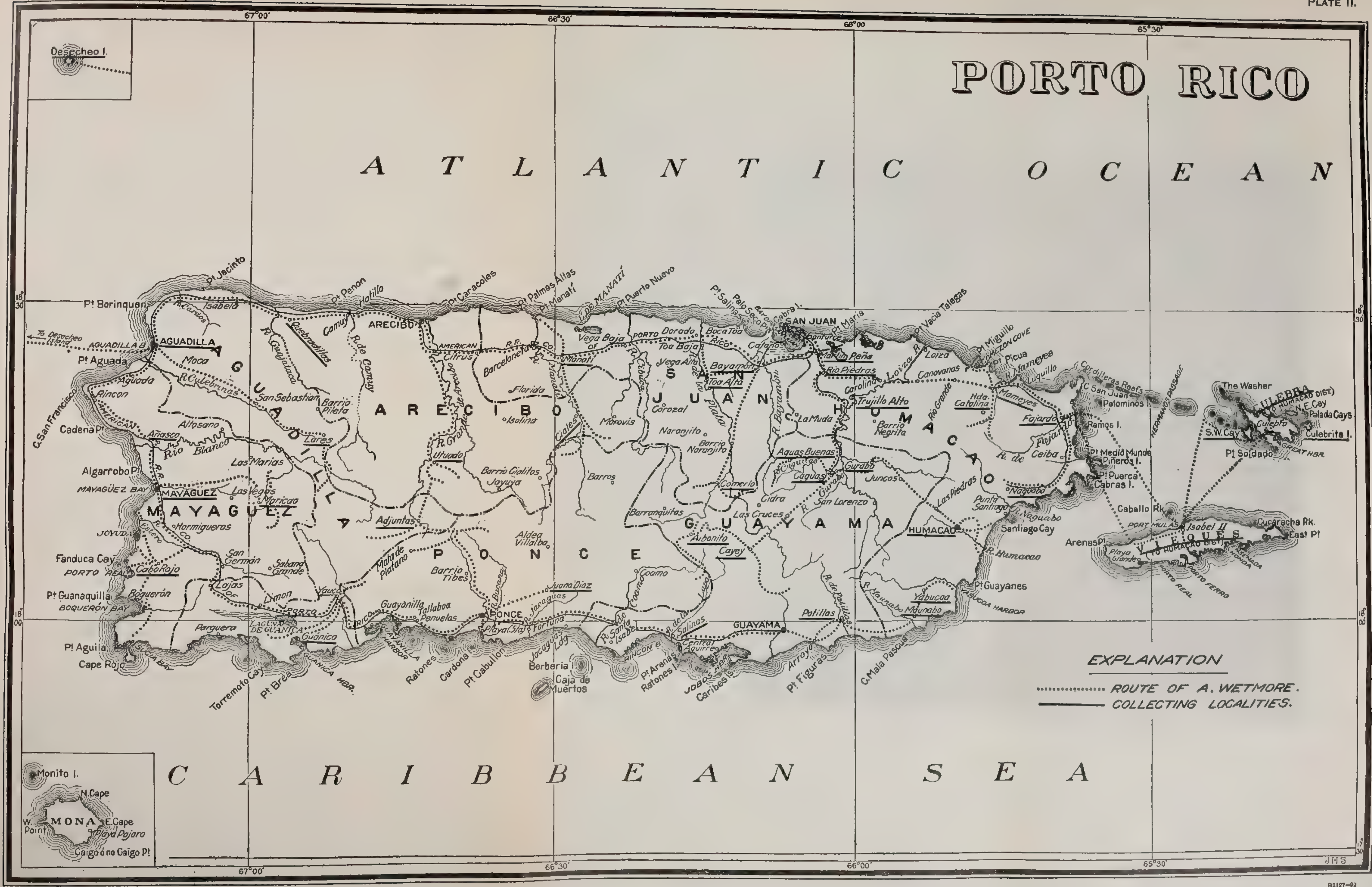
PORTO RICO
ATLANTIC OCEAN
CARIBBEAN SEA
67°00'
66°30'
66°00'
65°30'
18°30'
18°00'
Desecheo I.
AGUADILLA
MAYAGUEZ
ARECIBO
SAN JUAN
HUMACAO
GUAYAMA
PONCE
Culebra
Vieques
Mona
Monito I.
Pt Borinquen
Pt Jacinto
Isabela
Camuy
Hatillo
Manati
Vega Baja
Dorado
Bayamon
Rio Piedras
Carolina
Loiza
Luquillo
Fajardo
Ceiba
Naguabo
Yabucoa
Maunabo
Patillas
Arroyo
Salinas
Santa Isabel
Juana Diaz
Coamo
Aibonito
Cayey
Caguas
Gurabo
Juncos
Las Piedras
San Lorenzo
Cidra
Comerio
Barranquitas
Barros
Utuado
Lares
Adjuntas
Jayuya
Yauco
Guayanilla
Tallaboa
Penuelas
Guanica
Sabana Grande
San German
Lajas
Cabo Rojo
Boqueron
Hormigueros
Las Marias
Maricao
Añasco
Rincon
Aguada
Moca
San Sebastian
Quebradillas
Ciales
Morovis
Corozal
Naranjito
Toa Alta
Toa Baja
Trujillo Alto
Aguas Buenas
Barrio Negrita
Hda. Catalina
Mameyes
Palominos I.
The Washer
Cayo Santiago
Caja de Muertos
Cape Rojo
EXPLANATION
ROUTE OF A. WETMORE.
COLLECTING LOCALITIES.
JHS

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Map of Porto Rico Showing Route and Collecting Localities of the Author.

Only one lizard, the siguana (*Ameiva exul*), an important terrestrial form, is disappearing. Few of these, however, are eaten by birds, so that their diminution is to be charged to other agencies, perhaps to the mongoose, as this lizard can not climb. Many spiders also are eaten, more especially in the dry localities where they abound.

The value of the birds studied here is necessarily ascertained largely through a consideration of their insect food, certain dominant insect forms being so destructive that their bird enemies are of the utmost importance. The economic status of many insects common in Porto Rico is at present uncertain, and as they are more thoroughly studied some will undoubtedly prove very destructive; the lists of insects identified, as contained in the body of this report, will then serve as an index to their bird enemies so far as at present known. It is unfortunate that a robust bird like the pearly-eyed thrasher (*Margarops f. fuscatus*) should devote its attention to wild fruits instead of to insects, but the conditions favor frugivorous species.

With these brief general statements, we pass to a consideration of the bird enemies of a few of the well-known insect pests.

BIRD ENEMIES OF THE MOLE CRICKET.

The changa, or mole cricket (*Scapteriscus didactylus*), is without doubt the best-known insect in Porto Rico, as it is among the most injurious. Though found in other parts of the West Indies, in South America, and in southern United States, its ravages reach their maximum in the region under consideration. Living almost entirely in the ground, it escapes attention for the most part, and the adult, with its strong fossorial front legs and chitinous thorax, is too large and tough a morsel for many birds. The nymphs, small images of their parents, and varying in size with age, are more attractive to the average bird. At plowing time many are exposed to the watchful eyes of their enemies, and others, forced near the surface in the lowlands by water in the soil, are unceremoniously haled forth and swallowed. The blackbird (*Holoquiscalus brachypterus*), popularly considered one of the greatest enemies of "la changa," in reality destroys but few, though it sustains its reputation as a beneficial species in other ways, as will presently be seen. Other species, however, make up for the blackbird's shortcomings, and among them the despised martinete (*Butorides v. cubanus*), ridiculed for its ungainliness, ranks foremost. Standing watchfully, with head drawn in, among the short growth of the young cane fields, or walking with lengthened stride along the border of lowland pools, it spies and avidly swallows both adults and young of the mole cricket. The species at present known to aid in suppressing this pest number 21.

and following is a list of them arranged somewhat in order of importance (figures following the name of each species indicate the percentage formed by the mole cricket in the total bulk of the food):

	Per cent.
Martinete (*Butorides v. cubanus*)	54.33
Falcón (*Falco s. loquacula*)	28.69
Playero (*Oxyechus v. rubidus*)	14.42
Putilla (*Actitis macularia*)	10.78
Garza (*Florida c. cærulescens*)	7.23
Judío (*Crotophaga ani*)	5.69
Ruiseñor (*Mimus p. orpheus*)	3.62
Clérigo (*Tolmarchus taylori*)	3.04
Pitirre (*Tyrannus d. dominicensis*)	2.36
Juí (*Myiarchus antillarum*)	1.27
Garzon blanco (*Herodias egretta*)	1.00
Julian chiví (*Vireo latimeri*)	.90
Zorzal (*Mimocichla a. portoricensis*)	0.86
Múcaro (*Gymnasio n. nudipes*)	.60
Canario de manglar (*Dendroica p. bartholemica*)	.25
Gorrión (*Coturniculus s. intricatus*)	.25
Mozambique (*Holoquiscalus brachypterus*)	.21
Calandra (*Icterus portoricensis*)	.21
Pajaro bobo (*Coccyzus m. nesiotes*)	.21
Zorzal negro (*Margarops f. fuscatus*)	.16
Becacina (*Gallinago delicata*), one bird only examined.	

BIRD ENEMIES OF THE SUGAR-CANE ROOT-BORER.

The sugar-cane root-borer (*Diaprepes spengleri*), known also as the orange leaf-weevil, is abundant and has long been known as injurious to citrus stock. The adult feeds on leaves of the sugar cane, orange, guava, avocado, mango, rose, and jobo, while recently the grub has been found to be the destructive cane root-borer whose depredations have been known for some time. The adult is common everywhere in weeds, cane fields, and on trees; and though two broods are said to emerge, a few may be found throughout the year. The grub, buried in the ground, is exposed to the attacks of birds during plowing and cultivation only. None were identified in any of the stomachs examined, though adults were eaten commonly by a number of birds. The blackbird especially eats large numbers, and the remains of as many as 16 were found in a single stomach. The larger flycatchers captured the greatest quantities, and the querulous-voiced ani is not far below them in usefulness. The insect was identified in the stomachs of 17 species of birds, listed in the order of their importance as follows:

	Per cent.
Clérigo (*Tolmarchus taylori*)	18.47
Pitirre (*Tyrannus d. dominicensis*)	17.19
Juí (*Myiarchus antillarum*)	11.22
Mozambique (*Holoquiscalus brachypterus*)	9.69
Judío (*Crotophaga ani*)	7.09
Múcaro (*Gymnasio n. nudipes*)	1.80
Mariquita (*Agelaius xanthomus*)	1.72
Bien-te-veo (*Vireosylva c. calidris*)	.51
Ruiseñor (*Mimus p. orpheus*)	.25
Zorzal (*Mimocichla a. portoricensis*), in 1 stomach.	
Calandra (*Icterus portoricensis*), in 3 stomachs.	
Gallito (*Loxigilla portoricensis*), in 3 stomachs.	
Gorrión (*Coturniculus s. intricatus*), in 1 stomach.	
Zorzal negro (*Margarops f. fuscatus*), in 1 stomach.	
Pajaro bobo (*Coccyzus m. nesiotes*), in 1 stomach.	
Pajaro bobo (*Coccyzus americanus*), in 1 stomach.	
Gallareta (*Gallinula g. galeata*), in 1 stomach.	

BIRD ENEMIES OF THE WEEVIL STALK-BORER.

The weevil stalk-borer (*Metamasius hemipterus*) is more common than generally supposed, as numbers were found in the stomachs of certain species of birds examined. The larva bores in the stalks of the sugar cane, and the adult insect, a long-snouted weevil, hides at the bases of the leaves. It is not at present known to injure other crops. The adult alone is available as food for birds. Fragments of these beetles were found in the following:

	Per cent.
Mozambique (*Holoquiscalus brachypterus*)	5.44
Pitirre (*Tyrannus d. dominicensis*)	5.30
Clérigo (*Tolmarchus taylori*)	1.53

Judío (*Crotophaga ani*), in 1 stomach.
Mariquita (*Agelaius xanthomus*), in 1 stomach.
Calandra (*Icterus portoricensis*), in 1 stomach.

BIRD ENEMIES OF THE MAY BEETLE.

Locally doing great damage, the May beetle, or caculo (*Lachnosterna* sp.), may be briefly mentioned as another well-known economic species. In the immature stage as the "white grub," or gusano blanco, thousands are turned out in furrows during the plowing season and then are exposed to the attacks of birds. The adults are strictly nocturnal, and so escape many birds, and the grubs are exposed for only a short time. However, several birds had eaten either grubs or beetles and are listed here. Of these, the múcaro (*Gymnasio n. nudipes*) is by far the most important, and by its nocturnal habit can successfully cope with adults when they are flying.

	Per cent.
Múcaro (*Gymnasio n. nudipes*)	24.40
Mozambique (*Holoquiscalus brachypterus*)	1.61
Garza (*Florida c. cœrulescens*)	1.00
Pajaro bobo (*Coccyzus m. nesiotes*)	.05

Pitirre (*Tyrannus d. dominicensis*), in 1 stomach.
Capacho (*Antrostomus carolinensis*), in 1 stomach.

METHODS OF INCREASING BIRDS.

Though, as has been stated, birds are more common in Porto Rico than is locally believed, it is desirable that their numbers be increased that they may aid in keeping injurious insects in check. One of the first steps in an attempt to increase bird life is to provide adequate legal protection both for the birds and for their nests and to make sure that the laws are properly enforced. Game laws should restrict the hunting of game birds to certain open seasons, as outlined in the report which follows; should provide bag limits; and also allow the collection of specimens under permit for scientific study and research. Although it may seem that birds should be protected absolutely, the few used in a proper study of their habits and economic status would have no effect on the great mass of individuals of any given species. Without such scientific study no advance can be made in knowledge regarding the birds themselves.

As an aid in the enforcement of protective laws no method is of more value than the education of school children. If they are taught to look on birds as friends and not to disturb them, many a brood of young that otherwise would be destroyed will reach maturity. Courses in nature study have been found interesting and profitable wherever undertaken in elementary schools, and will prove especially so in Porto Rico. The detailed knowledge of the natives concerning their island flora and fauna was noted by early historians, and has been corroborated and enlarged upon by travelers in the island for many years. Every bird, tree, and shrub was recognized and had its name. sometimes that bestowed by the aborigines, sometimes a cognomen given by the Spaniards from some resemblance to a form with which they were familiar in their native land. Now that a considerable proportion of the population is concentrated in towns, much of this stock of common knowledge is being lost, and many of the younger generation are strangers to it. The country boys and girls traveling to and from school through the coffee plantations or along the roads and trails become versed in the lore of out-of-doors from their elders, but in towns lack of this information among children is noticeable. Names remain without proper association with the objects to which they pertain, and a fund of common knowledge ages old in its inception and growth is in danger of being lost. It seems natural for a boy to throw stones or break eggs in the nests which his sharp eyes discover, but under proper guidance these misapplied energies may easily be directed to the encouragement and preservation of his feathered friends.

That birds need shelter as well as protection will not be questioned, and owners of plantations should look carefully to providing this if it is not already present. A long level stretch of cane or tobacco, with not a tree or other obstruction to break its continuity, while a pleasing sight to the agriculturist, offers little encouragement to the bird in search of shelter and food. A similar stretch of cultivated land, with lines of symmetrical royal palms or coconuts along the roadways and dense clumps of graceful bamboos adorning the borders of streams, while not losing an iota of its productiveness, will gain in esthetic charm and beauty and provide an attractive feeding ground for birds which will more than repay the owner in the great numbers of injurious insects they consume.

In cane fields during the preparation of the soil fence posts offer convenient perches for such birds as the sparrow hawk and gray kingbird, which require commanding outlooks from which to watch for their prey. Later these posts are overshadowed by the cane, but if more trees were present inducement would be offered the birds to frequent the fields throughout the season. The jobo (*Spondias lutea*), with its open limbs and small shade, is a favorite perch and nesting site of birds, and the spiny trunk is a protection against terrestrial nest robbers.

All birds desire shelter from the burning heat of the midday sun, and this should be made available. Green herons, or martinetes, and anis prefer clumps of bamboos, while blackbirds frequent palms. Brushy growths on waste lands should not be cleared too closely, as they harbor many useful birds, while in localities where birds are scarce small plantings might be made on the least valuable soil for their encouragement. Tobacco fields seem especially barren of shelter, and though for a small portion of the year the more valuable parts are shaded with cheese cloth, during the remainder birds would perform valuable service in ridding the soil of insects.

Another class of birds needs safeguarding in a different way. In the coast region at present are found numbers of little blue herons, snowy herons, and green herons, which nest in colonies in dense growths of tall mangroves. From these rookeries they spread inland into the cultivated areas in search of food, destroying large numbers of mole crickets and other injurious insects. These swampy tracts are being steadily cut over and cleared in the quest for wood for charcoal, and thus breeding places are destroyed. The little green heron, or martinete, can survive this, as it nests frequently in bamboos and other trees, but the other species will be greatly reduced in numbers unless some of these shelters are preserved. Part of this swampy territory is still under government control and could be set aside as bird reserves and the important rookeries preserved; but where these are found on private land the owners should be far-sighted enough to leave untouched portions of the swamps occupied by the herons, as such measures will repay them in the long run. The most important localities where conditions should be investigated are between Salinas and Guayama, below Yabucoa, Piñero Island off Ceiba, Comezon Cove north of Mameyes, the lagoons north of Río Piedras, the region about San Juan Bay, the coast region near Vega Baja, and the swampy regions about Porto Real and Joyuda near Cabo Rojo. Suitable localities, even though at present cleared, would in a very few years be covered by new growth and so furnish shelter.

The martin, which nests in natural cavities in trees or in crevices about buildings in towns, might be attracted to the country if nesting boxes were provided. A hollowed-out calabash on a pole would be as readily accepted as a more pretentious mansion capable of housing several pairs, but the shelter should in all cases be placed in an open location with a free sweep on all sides and well elevated. At present no attempt is made to attract these valuable birds by artificial nesting sites, but from their habits they should respond as readily as the species found in the United States.

Persons interested in watching birds about the house might attract some species by planting a few of the wild fruits of which they are fond and which may be ascertained from the lists given on other pages of seeds identified in the stomachs examined. The majority of species of birds found in Porto Rico seem to be local in distribution; that is, they do not wander beyond their own immediate territory, and under proper encouragement and protection their numbers should greatly increase. The tendency is to cut away tree and brush growth at the borders of fields and on waste lands and so to decrease the available shelters for birds. With these conditions righted bird life should multiply and increase to the maximum which can exist on the island.

INTRODUCTION OF BIRDS.

Six species of birds are known to have been introduced in recent years into the island of Porto Rico, though only one, the hooded weaver finch (*Spermestes cucullata*), has spread over a large area. Of the others, the quail (*Colinus v. cubanensis*), introduced near Vega Baja, is apparently extinct; and the guinea fowl (*Numida meleagris*), known for many years as feral on this island, is very rare. The South American troupial (*Icterus icterus*), though found in Gundlach's time in a few localities, has apparently vanished; while the scarlet-cheeked weaver finch (*Amandava melpoda*), unlike the other member of the same family, has been known for many years only from the southwestern corner of the island and is still restricted to that range. There are no records to show how, when, or by whom these birds were introduced. The turkey vulture (*Cathartes a. aura*), found near Guánica, has not extended its range, though conditions are favorable for it over the entire island. None of the exotic species acclimated are injurious, and one, the vulture, would be decidedly beneficial if more common. The hooded weaver finch, at present harmless and living almost entirely on grass seeds, might, if rice culture were again attempted on a large scale, do considerable damage.

After a careful study of the conditions the introduction of insectivorous or frugivorous species would seem to the writer to be of doubtful value. Only species of economic importance will here be considered. To cope with the island insect pests at present attracting attention, the birds would have to be of moderate size at least. In addition to this they would have to be brought in from near-by islands or from continental tropical areas. In the present state of our knowledge concerning the food habits and general economy of tropical forms not a single species can be confidently recommended.

Too little is known of the food of tropical birds to merit their introduction into Porto Rico. Flycatchers, cotingas, becards, or members of the family of troupials, brought from the continent or other islands within the Torrid Zone, might prove to be almost entirely frugivorous or develop an abnormal appetite for the abundant lizards and tree toads, which already suffer enough from the depredations of native forms of bird life and under the added weight of new enemies might be exterminated.

It is very doubtful if birds of well-known habits introduced from the United States would breed and rear their young under tropical conditions. Only an occasional species seems able to sustain itself when subjected to a new environment, and in order to do so it must be capable of assimilating a somewhat omnivorous diet, as forms specialized in regard to food or habits are almost certain to perish.

Should it be desired, however, to experiment in the introduction of extralimital birds, the barn owl (*Tyto perlata*) is recommended, as this bird is almost cosmopolitan in its range. Raptorial species are rare on the island, and as the fondness of the barn owl for rats is well known it is likely to prove a profitable introduction. In case the attempt is made, birds should be secured from Cuba or Jamaica or from as far south in the United States as possible, and shelters in the form of dove cotes should be provided for them in secluded places bordering the cane fields. It would be necessary to supply them with a small quantity of food until they become accustomed to the change of environment and could become self-supporting.

Should the birds increase, other shelters would have to be provided, as natural cavities are not found in sufficient numbers.

At present no species capable of coping with the changa or caculo can be suggested which would thrive on the island and not be destructive to other interests. In clearing any circumscribed territory of its original forest and introducing methods of agriculture more or less intensive, great changes are wrought in the relations of the manifold interdependent forms of life found therein. This is shown plainly in the bird life of the island of Porto Rico. Certain species entirely dependent upon forest conditions for a suitable habitat have become very rare or in some cases extinct. Others more plastic, changing their haunts in conforming with new conditions, have held their own, or, in a few cases, have increased in number. It can not be supposed that in pre-Columbian times, when the island was entirely covered with trees, such birds of the open as the blackbird, ani, and gray kingbird were found in anything like their present numbers. Happily, the disappearing species are not highly beneficial and their place is filled by individuals of much greater economic value. To introduce a number of foreign species when nature is striving to attain equilibrium would only cause further disruption and disturbance. Energies should rather be directed toward the increase in number of the native birds, whose habits are better known and understood.

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ANNOTATED LIST OF SPECIES.

FOREWORD.

The species of birds discussed in the following pages comprise all those known at present to inhabit or to visit Porto Rico. For each species are given the names under which it is known, a brief account of its habits, and a statement regarding its food and economic status. Where deemed advisable, detailed lists of insects and other animals, seeds, and fruits identified in the stomachs are given in systematic order, so that as the status of other forms of life becomes known the relation of the birds to them may be more easily ascertained. Birds which have been enumerated by previous authors, but the occurrence of which has been found to be doubtful, have been included in brackets, with a brief summary of their status. A bibliography of important titles referred to in the preparation of this paper is given and, though not exhaustive, will prove of value. In citations reference is made to author, year of publication, and page. In case of two titles by the same author in one year, the second is distinguished by the letter a, following the year.

ANTILLEAN GREBE. *Podilymbus podiceps antillarum* Bangs.
ZARAMAGO, ZARAMAGULLON, SARAMAGULLON.

The Antillean grebe is known in the lagoons along the coast, but is retiring and seldom seen. In some of the large lagoons it is resident, though migrants undoubtedly occur in the winter months. At the Laguna de Guanica these birds were fairly common the last of May and very wild from much hunting. July 9 I saw two pairs on a large lagoon northeast of Manati that were evidently mated. As I walked along the shore they swam out, two together, with the male bowing and nodding, advancing and retreating before the female, cackling loudly, *kah kah kah*. One pair was seen feeding offshore, diving regularly in the shallow water.

They occur at times in very small sloughs where there is an abundant growth of water plants to protect them, as in the charcos along the Bayamon River, near Bayamon. Here they are seen only by chance, perhaps merely a ripple in the water betraying their passage in the dense vegetation.

Food.—The stomach of a single bird collected at the Laguna de Manati July 9 contained fragments of 2 dragon flies and more than 25 small crawfish. Besides this there was the large mass of feathers always found in grebe stomachs, in the present case forming more than 65 per cent of its contents. Bowdish (1902–3, p. 357) found the remains of three crawfish in one stomach, together with a small quantity of "mammal hair," which may have been the feathers alluded to. From such meager data the grebe appears to be beneficial in Porto Rico as elsewhere.

WEST INDIAN GREBE. *Colymbus dominicus dominicus* (Linnæus).
TIGUA, SARAMAGULLON, ZARAMAGULLON.

The West Indian grebe is undoubtedly a rare resident in Porto Rico, for while small grebes are reported from several localities none were seen. Gundlach (1878, p. 395) found them at the Laguna de Guanica. Stahl (1887, p. 453) evidently did not consider them resident, as he says that they occur on the ponds in winter. Richmond (MS.) notes specimens in a collection of birds in San Juan, taken by Stahl. In general this species is said to resemble the Antillean grebe, and probably agrees with it in food habits.

[**RED-BILLED TROPIC BIRD.** *Phaëthon æthereus* Linnæus.
Gallinaza.

The red-billed tropic bird is uncertainly attributed to Porto Rico, though there is reason to suppose that it occurs occasionally at least. Catesby (1743, p. 14, Appendix) said that the birds bred in great numbers on some little islands at the east end of Porto Rico. Taylor (1864, p. 172) remarks under this species that he frequently saw tropic-birds flying about the harbor of San Juan, and all later authors appear to have quoted him. In habits, food, and general appearance it is said to resemble the yellow-billed species.]

YELLOW-BILLED TROPIC BIRD. *Phaëthon americanus* Grant.
Gallinassa, Gaviota, Rabijunco, Chirre de Altura.

The yellow-billed tropic bird is fairly common around Porto Rico. On the wing it is very strong and graceful, beating back and forth with long tail feathers blowing in the wind. The call note is a harsh, gull-like *kik.*

July 5 three were seen near some rocky cliffs north of Quebradillas, where they circled with rapidly beating wings about 40 feet above the water, swinging far out to sea and then returning to the shore. Gundlach (1878, p. 419) found them nesting on the rocky cliffs in this same locality. He secured fresh eggs April 5, and describes the plumage of the young.

Food.—Of two stomachs of this species available for examination one was entirely empty, though the bird was taken in the midforenoon. The other contained a few remains of fish bones. Fish undoubtedly form the great share of their food. The birds are too few to be of economic importance and the fish eaten are of little value.

BROWN PELICAN. *Pelecanus occidentalis* Linnæus.
Alcatraz.

The brown pelican is common in the coastal region of Porto Rico, Vieques, and Culebra, but is not known around Desecheo and Mona Islands, where shallow protected bays are lacking. The birds occur more commonly where there is shoal water over reefs, or in bays where small fish are abundant. The nesting season probably begins in February and extends to September (Gundlach, 1878, p. 416). Richmond (MS.) saw a young bird in a store window in San Juan March 29, 1900. Specimens seen in April and May had the seal-brown feathers of the nuptial plumage on the back of the neck. The birds are said to breed in June on sandy keys off the Playa at Humacao, and on the low flat islet known as Caballo Blanco at the entrance of Port Mulas, Vieques Island. On May 8 at Yabucoa a young bird three-quarters grown and well covered with fine gray down was seen on a mud bank at the mouth of a river. It showed no fear and was easily caught. When examined it objected by snapping the bill loudly, but did not attempt to bite. Upon being released it merely swam off a few feet and then remained quiet on the surface of the water.

Food.—The stomach and pouch of a specimen examined in the field contained small fish only, and these apparently form the entire food. Unless about a fish hatchery (and there are none at present in the islands) they are harmless and worthy of protection. Though the fish taken are commonly used as food by man, they are so abundant that the few eaten by the pelicans are negligible.

RED-FOOTED BOOBY. *Sula piscator* (Linnæus).
Pajaro Bobo.

Red-footed boobies were seen on Desecheo Island from June 13 to 16 and were much fewer in number than the common booby. Those on the island, about 2,000 in all, were gathered in a close colony 200 feet above the water among growths of West Indian birch (*Elaphrium simarubra*) and other shrubs. The adults in white plumage were very conspicuous and were much wilder than either the young or the other species of booby. From *S. leucogastra* they can readily be distinguished by their smaller size, even on the wing. Second-year birds in a grayish plumage with white tail and undertail coverts were seemingly in pairs and ready to nest. These birds were much lighter on the wing than the larger species and rose with less effort. Their general habits were the same as those of the larger bird. They have not been recorded from Porto Rico before, though Bowdish (1902–3, p. 358) noted that there may have been a second species of booby on Desecheo Island at the time of his visits.

There is some uncertainty as to the breeding period of the two species of boobies here. Native fishermen say that they nest in October or December, while W. W. Brown, jr. (Cory 1892a, p. 229), found them nesting on Mona in February. From the condition of plumage in some of the young birds, they might have been hatched about that time, but others were evidently older. It is probable that some of the birds nest irregularly throughout the year, as the seasons are not sharply defined. In food and economy this species does not differ essentially from the common booby.

BOOBY. *Sula leucogastra* (Boddaert).
PAJARO BOBO, BUGUERE.

A booby rookery is reported on some rocky islets between Culebrita Island and Cayo Norte, the birds coming in the last of April and nesting through May and June. Men are said to gather their eggs occasionally, but the birds are probably not much disturbed. These birds are protected by law, as the small islands surrounding Culebra have been set aside as a national bird reservation and as such are under the jurisdiction of the United States Department of Agriculture.

Boobies are found at times along the coast of Vieques Island also, and on Desecheo Island this species is the most abundant bird, a conservative estimate made in June placing its numbers at from 8,000 to 10,000. These birds are said by the fishermen to nest here from late June until October, and a few were seen playing with sticks and straws as though contemplating nest building. So-called sportsmen have visited Desecheo occasionally and shot these helpless birds merely to see them drop. The veriest tyro can hardly miss one even on the wing. They are unfit for food, and, having little fear, circle repeatedly over those already killed.

Field examinations of stomachs of boobies showed only remains of fish, though marine invertebrates doubtless are taken to some extent. Passing their lives about these remote islands, the fish eaten by them are of little or no economic importance, even though the birds are numerous. The colonies here are now safe under Federal protection, and the birds should maintain their numbers.

MAN-O'-WAR BIRD. *Fregata magnificens* Matthews.
RABIJUNCO, RABIHORCADO, TIJERILLA.

The rabijunco is well known to the fishermen around the coast line of Porto Rico and its appearance is supposed by some to presage a storm. About Vieques and Culebra Islands they were occasionally noted soaring high over the ocean, usually well out from land. At Culebra, on April 11, one flew down and picked up a dead tropic bird which I had shot, but dropped it after carrying it a few feet. On another occasion in half a gale one flew over the town of Playa Sardine in pursuit of a royal tern, calling *kik kik kik* sharply. The tern zigzagged back and forth, but its pursuer followed without apparent effort, although it finally gave up the chase. August 1 an adult female was seen in San Juan Harbor, circling over the marina and custom-house, curiously watching men at work on the water front. Bowdish (1902–3, p. 359, and in MS.) states that he found an abundant breeding colony on Mona Island.

On Desecheo Island from June 13 to 16 there were about 175 adults, all having young three-quarters grown. The majority of the young, one in a nest, were well feathered except about the head, although two were still entirely covered by down. The eggs are said to be laid in October. Four breeding colonies were located on the island, three of them within 400 feet of the water, and one near the top of the highest hill. The young sat quietly on the small platform nests with heads drawn in on the shoulders, but when I came near they clattered their bills loudly, and, snapping and squealing, gave up peace offerings in the form of unsavory masses of partly digested fish, while they crowded back, taking care, however, not to leave the nest. When nests were close together the young were continually fencing with their bills, rattling them loudly, and flapping their wings. One that I kept at camp was always ready to fight, but spent its time when undisturbed in sleeping or resting quietly with head drawn in on the shoulders. The food of the birds was entirely small fish, though the one at camp occasionally swallowed bits of meat. Usually, however, even when placed far down in the throat, meat was ejected by shaking the head violently sidewise.

Family cares did not seem to weigh heavily upon the adults. In the early morning they were at the nests, but were always on the wing by full daylight, and from then until evening passed most of their time circling in flocks over the island. As nearly as could be ascertained, the young were fed morning and evening and were seldom visited during the rest of the day. Sometimes three flocks of adults were seen circling slowly around, the highest mere specks in the sky. At dusk the birds returned with squealing calls, and there was considerable uproar in the rookeries until all were settled. Usually the long forked tail was held closed in flight, but occasionally was opened and shut scissors fashion.

These birds may at times be predacious, as shown by the actions of the one which attempted to carry off the tropic bird, and by their habit of pursuing gulls, terns, and possibly boobies, for the food that they may disgorge. The same remarks apply to their economic status as to that of the booby.

YELLOW-CROWNED NIGHT HERON. *Nyctanassa violacea* (Linnæus).

YABOA, YABOA REAL, GUANABA.

The yellow-crowned night heron is apparently becoming rather rare in Porto Rico. Gundlach (1878, p. 363) records it as common, and Bowdish (1902–3, p. 359) also so speaks of it in the localities that he visited. He found it even on Mona Island in August, 1901. It is a bird well known in the coast region, and the fact that it is considered a game bird and prized for the table explains its lessening numbers. The bird inhabits the mangroves and heavy forests covering the swamps, and near Mameyes one was flushed from a coconut palm. In the mangroves they sometimes slip away on foot and hide.

The single stomach examined was taken in the middle of the day and was entirely empty. Bowdish (loc. cit.), however, found fiddler crabs, two eels, and two crawfish in stomachs which he opened. From these meager data the food of the birds would not seem to differ materially from that of other herons. Detailed examination might show that they feed to some extent on the mole cricket. For the present at least they should be removed from the list of game birds and afforded protection.

BLACK-CROWNED NIGHT HERON. *Nycticorax nycticorax nævius* (Boddaert).
YABOA, YABOA REAL.

The black-crowned night heron was apparently fairly common at one time in Porto Rico, though there are no recent records of its occurrence. Sundevall (1869, p. 602) received a single specimen from Hjalmarson, and Gundlach (1874, p. 313) records it as in Hjalmarson's collection in Arecibo. Gundlach also (1878a, pp. 161, 187) notes specimens taken by himself and says (1878, p. 362) that is was not rare. Stahl (1883, p. 150) had five specimens in his collection. Beyond this nothing is known of its occurrence.

LITTLE GREEN HERON. *Butorides virescens virescens* (Linnæus).
MARTINETE.

A specimen of the little green heron in the United States National Museum, taken at Fajardo, February 16, 1899, by A. B. Baker, has been identified by Oberholser (1912a, p. 540) as this subspecies. This is the only record at present for the West Indies.

CUBAN GREEN HERON. *Butorides virescens cubanus* Oberholser. (PLATES III and IV.)
MARTINETE, AGUAITA-CAIMAN.

The Cuban green heron is one of the commonest birds in Porto Rico and is distributed all through the coastal plain. On the northwest coast at Quebradillas and along the south coast in the dry regions they frequent the borders of streams mainly, though found occasionally in dry upland pastures (Quebradillas). The irrigated lands of the south coast are peculiarly adapted to their needs, and along ditches and channels in the fields they feed in abundance. In the lagoon region their centers of distribution were in the mangroves and swamps, and from these they spread into the surrounding cultivated lands. At Yabucoa they fairly swarmed in such localities and did an incalculable amount of good. After the breeding season they seem to wander inland. On Vieques they were tolerably common about the lagoons, but only a few were seen on Culebra. May 8, at Yabucoa, the number seen was estimated at between 1,500 and 2,000, all breeding adults.

Clumps of bamboos along streams were favorite perches. To these growths numbers retired to escape the burning heat of the midday sun, and in many localities they were used as nesting sites. Most of these birds, however, still nest in the mangroves and swampy growths bordering lagoons and lowland streams.

The breeding season extends from the first of February to the end of May and the young are well grown by July 1. The nests are simple structures of sticks. One examined May 8 near Yabucoa contained three fresh eggs of a pale greenish color marked with lime deposits on the shell.

Green herons are nearly always tame, unsuspicious birds, and seldom fly until closely approached, except in regions where they are much hunted. When they do flush, they rise with a series of squawking notes and before going far light on the ground again, on a fence post, or the limb of a tree. Sometimes they endeavor to escape notice by drawing the body up, pointing the bill straight in the air and presenting the striped breast to the observer. In feeding they follow slowly along the borders of marshes and lagoons, never wading in deeper water, as do the larger long-legged herons, or follow along the rows in the cultivated cane fields. Open pastures are favorite localities also, and here they work through the short grass, preferring low damp localities, but not neglecting those high and dry. Unless very hungry they are rather sluggish, and frequently spend an hour or more standing motionless with the neck drawn in.

The ordinary note is a harsh squawk, though frequently after alighting they give a clucking note, while a note of anger may be represented by *kek*

kek chuck chuck. A gunshot along a stream where they are common always calls forth a series of protesting squawks from birds hidden in clumps of bamboos and at the edge of the water. At the end of the breeding season, after the first of July, the young birds were abundant and were continually harried and pursued by the adults, which flew after them in the air or ran at them on the ground with open mouths, so that only in the bushes were they safe.

Where slopes along the streams are steep, as at Comerio, the birds remain close to the water. In more level localities they wander a great deal.

Food.—Fifty-one stomachs, collected from December to August, were available in studying the food of this bird. In these animal matter made up 99.18 per cent and vegetable 0.82 per cent. Orthoptera and crustacea form a large part of the animal food, and the vegetable matter is merely rubbish.

Animal food.—The destructive mole cricket (*Scapteriscus didactylus*), so well known in Porto Rico, forms 54.33 per cent of the total food of the period. No other bird of the Porto Rican avifauna eats them to such a large extent. They appear in 31 of the stomachs examined and in some make up the entire content. Three stomachs taken in January and two in August contain little else, while the smallest proportion, 13 per cent, occurs in the month of June. Both adults and nymphs were eaten, and one stomach contained 9 of the insects, while another had 11 pairs of jaws in it. Other orthopteran remains, amounting to 5.92 per cent, were found in 12 birds, and in 8 the remains were those of Locustidæ. One stomach contained a large grasshopper identified as *Neoconocephalus macropterus*, another a locust (*Plectrotettix gregarius*), and another a cricket (*Gryllus assimilis*). Dragon-fly larvæ, with the abdomen of one adult and several damsel flies, were found in 12 stomachs and figure as 3.84 per cent of the food. Insects of other orders formed but 6.73 per cent. One stomach contained a predacious diving beetle (*Acilius circumscriptus*), another a click beetle (*Drasterius* sp.), a third a small lamellicorn (*Atænius gracilis*), while a water scavenger beetle (*Tropisternus collaris*) and larvæ of others occurred five times. Aquatic bugs were found in nine cases, water bugs and back swimmers being best represented, while one water strider (*Gerris marginata*) was identified. Moth remains and a caterpillar represent the Lepidoptera, and one bird had eaten an ant. Other insect remains comprised Neuroptera in three stomachs and Diptera in three others.

Although fish remains appeared in 16 cases, they form only 9.52 per cent of the food. Small killifishes and gobies (*Dormitator* sp.) were found, all of small size. Crustacea had been eaten by 18 of the birds, small crabs in two stomachs and crawfish (*Macrobrachium olfersii, Xiphocaris elongata*, and others) in the remainder, forming in all 14.71 per cent. Five stomachs contained lizards of the genus *Anolis*, constituting but 1.15 per cent of the food. One was specifically identified as *Anolis pulchellus.* Three stomachs contained bones of the little tropical frogs *Leptodactylus albilabris,* known universally in Porto Rico as ranas, and these formed 0.61 per cent. Miscellaneous animal matter, consisting of spiders, a copepod, a marine annelid, and aquatic worms, amounted to 2.37 per cent for the nine months represented.

Vegetable food.—Vegetable matter, almost entirely accidental, was found in 11 stomachs. A few seeds of purslane (*Portulaca oleracea*) and two seeds not identified had been eaten by one bird, but the large part of the vegetable matter consisted of bits of grass and vegetable fiber. Only one immature bird had eaten a large amount of vegetable matter.

Owing to its unsuspicious nature and the ease with which it can be killed, the green heron suffers more than any other heron at the hands of " sportsmen," but the bird is of the greatest economic importance and one that should be protected at all times. The small portion of rather unsavory meat on its body is insufficient to warrant the hunting of a bird which from the standpoint of the agriculturist is one of the most important species on the island. It should be protected, especially at nesting time, and encouraged by planting bamboos as permanent shelters along streams and drainage ditches. This species should hold its own and even increase largely, because of its adaptability to new conditions. The south coast especially, with the present area under irrigation and large projects under way, is very favorable to the green heron, and this bird is one of the few economic species especially adapted to that region.

LITTLE BLUE HERON. *Florida cœrulea cœrulescens* (Latham).
GARZA, GARZA AZUL.

The little blue heron, rather evenly distributed around the coasts of Porto Rico and absent or rare only where there are no marshy grounds or lagoon areas, was perhaps more abundant near Mameyes, Yabucoa, and Guanica than elsewhere. On Vieques it was the most common heron, and a few were seen on Culebra Island.

The birds inhabited lagoons, mangrove swamps, and marshy borders of rivers and were common in wet lowland cane fields. They often fed inland along the rivers and in the cane fields 3 or 4 miles from the coast. When disturbed, the ordinary note of the bird is a harsh *kar-r-rk.* The flight is strong and direct and in a high wind rather graceful. Nests which the birds had apparently just built were seen near Mameyes as early as February 9, while near Yabucoa a large colony had eggs the first of May. The nests were loosely constructed of twigs and were situated from 10 to 30 feet above the ground in mangroves and other trees in the swamps. The largest colony seen, near Yabucoa, contained over 150 pairs. In this rookery the birds left the nests when disturbed and circled overhead, some perching on dead limbs, craning their necks, and creating great bustle and general confusion. A mongoose, seen rather methodically searching the open ground under the trees, would without doubt have disposed of any fallen young. When breeding, the birds passed back and forth morning and afternoon to feeding grounds in the cane fields, many of them going several miles inland. When flushed in the cane fields, they returned to the coast region and did not light in the bamboos or other trees, to return to the ground later, as the green herons do. Sometimes after circling several times high in the air they dropped back a distance away to feed. Flocks of 15 or 20 sometimes waded out in shallow bays at low tide, searching for food, and when the tide came in retired to the mangroves.

After the breeding season little blue herons appear to spread out more and wander inland, occasionally as far as the base of the foothills, so that in August they were seen on the Guanajibos River below San German. Some birds go even farther up along the streams. On Vieques Island they flew inland with regularity to feed in the dry pastures. Usually three or four came together soaring and sailing and then circled slowly to the ground, where they walked about looking for food. On Culebra Island one was found only occasionally in the mangroves.

Many birds in white and in pied plumage were seen, and many of those taken in February were molting.

When undisturbed, as near Mameyes on the northeast coast, they become very tame. When a boat passed through the channels, the herons flew out continually from the mangroves with a rush of wings and harsh calls, alarming all other denizens of the swamps.

Food.—Fifteen stomachs of the little blue heron taken in February, March, May, June, and August were found to contain animal matter to the extent of 97.22 per cent, leaving 2.78 per cent for vegetable content. Miscellaneous insects, lizards, and crustaceans form the bulk of the animal food, while the vegetable matter is accidental rubbish secured with other food.

Animal food.—Mole crickets (*Scapteriscus didactylus*) make 7.23 per cent of the total and were found in six stomachs. In one bird taken at Yabucoa I counted 35 jaws, and in each of two others were found two entire adults. Other insects formed 31.51 per cent, so that nearly two-fifths of the food of this bird is taken from the great class Insecta, a surprising amount for a bird of such aquatic habit. Nymphs of grasshoppers and locusts were found in five stomachs and caterpillars in four. Water bugs and water striders figure in three instances and dragon-fly larvæ of the suborder Anisoptera twice. Water scavenger beetles occur five times and several were identified (*Hydrophilus* sp., *Stethoxus ater*, *Tropisternus nimbatus*, and *Berosus* sp.). May beetles (*Lachnosterna* sp.) had been eaten by two birds and figure as 1 per cent of the food, while another scarabæid beetle was found in one instance. Only one insect belonging to the order Hymenoptera was found. Miscellaneous animal matter, composed of two frogs (*Leptodactylus albilabris*), one spider (*Tetragnatha antillana*), and some indeterminate material, forms 0.59 per cent.

Crustaceans were present in 8 of the 15 stomachs examined and form 27.4 per cent of the contents. Crabs of four species (*Uca pugnax rapax*, *Aratus pisonii*, *Sesarma* (*Holometopus*) *roberti*, and *Goniopsis cruentata*) were identified in five individuals. Two species of shrimps (*Macrobrachium acanthurus*, and *M. olfersii*) were noted four times. Lizards form 29.44 per cent, and are probably the food sought when the birds visit the inland pastures. Twenty-one small lizards (*Anolis* sp.) were found in one stomach, together with ground-up remains of several more. Another contained three lizards of larger size (*Anolis pulchellus*), and four the ameiva (*Ameiva exul*). A small goby was found in one stomach.

Vegetable food.—The vegetable food, 2.78 per cent, may be considered entirely as rubbish, though it included seeds of purslane (*Portulaca oleracea*) and one other species. The great portion, however, was merely taken in with other food and in no case forms an appreciable bulk of the stomach contents.

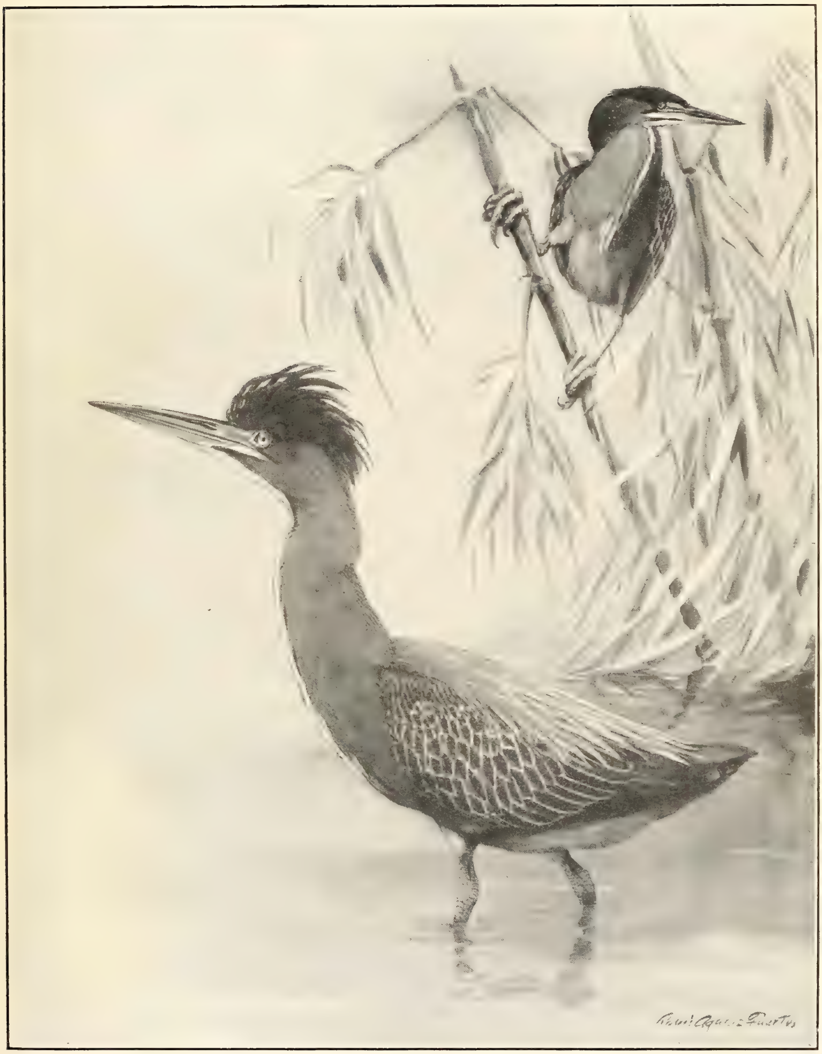
The practice in many localities of treating these herons as game birds is to be deplored, as they are highly beneficial. At Yabucoa it was common for parties to hunt "garzas," and, although the little green heron suffered too, the blue heron, being larger, was more prized for the table. Their breeding grounds everywhere are being encroached upon by the charcoal burners, who are cutting the mangroves, and unless measures favorable to these herons are adopted a bird of considerable economic importance will be lost to the island. Men were seen busily engaged in cutting trees near the largest colony, and in a short time would have reached the rookery itself. By making reserves of some of the places occupied by the herons and by forbidding their hunting at all times their numbers should materially increase. Their flesh is inferior at best, and as for "sport," such a term can hardly be used in connection with the pursuit of large straight-flying birds like these, even though much hunting has made them rather wary.

The harm done by the birds in the destruction of lizards is greatly outweighed by good done in other directions, and lizards, except in case of the ameiva, do not seem to be decreasing in numbers. The value of this heron to the agriculturist lies in its destruction of the mole cricket and other injurious insects.

LOUISIANA HERON. *Hydranassa tricolor ruficollis* (Gosse).

GARZA, GARZA DE CUELLO ROJO.

Gundlach (1878, p. 356) found the Louisiana heron only on the southwest coast at Boqueron, where it was common. In the present work the species was



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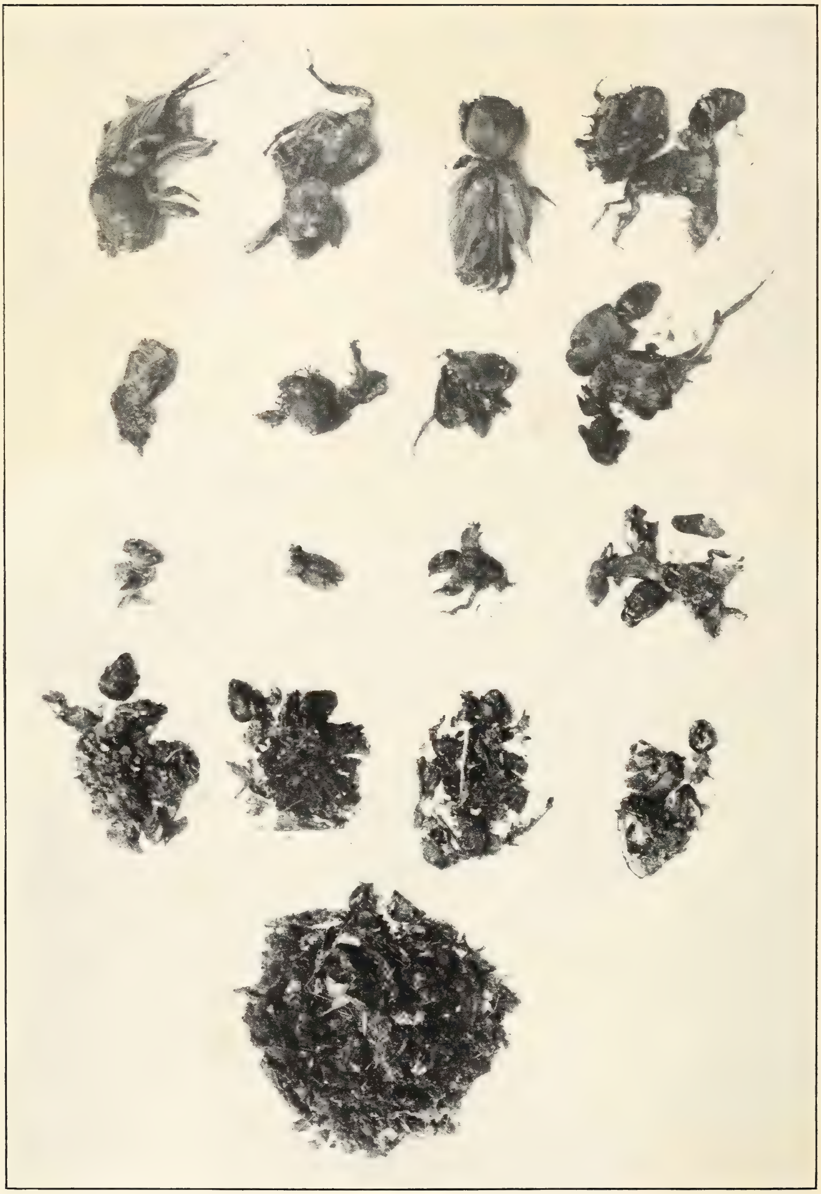
CUBAN GREEN HERON, OR MARTINETE (BUTORIDES VIRESCENS CUBANUS).



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STOMACH CONTENTS OF A CUBAN GREEN HERON, OR MARTINETE (BUTORIDES VIRESCENS CUBANUS.)

The martinete ranks first among the bird enemies of the mole cricket, or changa (*Scapteriscus didactylus*). Sixteen entire changas and fragments of others were found in one stomach.

seen in the lagoon region between Salinas and Guayama, where on May 3 several were wading in shallow bays and pools. There are no other definite localities recorded for it on the island. The single bird examined had eaten 16 small fish from 1 to 2 inches long, among which was 1 goby, the others being killifishes. These are all food fishes, but not of sufficient value to condemn the bird, as it is too rare here to do any appreciable damage.

SNOWY EGRET, SNOWY HERON. *Egretta candidissima candidissima* (Gmelin).
GARZA, GARZA BLANCA.

The snowy egret is resident in Porto Rico, being distributed throughout the lagoons of the coastal region and about the mouths of the rivers, usually ranging 3 miles or more inland. After the breeding season the birds appear to wander, as on August 8 one was seen flying up the Rio Vivi at Utuado. While still fairly common, especially in the large, more inaccessible swampy regions, the egret has suffered much at the hands of plume hunters, and I was told that as late as 1910 plumes had been offered for sale in Caguas.

March 16 about a dozen were seen on Piñero Island, off Fajardo, where they are said to breed. At Salinas the birds were said to be nesting on low mangrove-covered islands lying offshore, and parties of three and four were seen flying back and forth between these islands and the mainland, frequently 200 feet in the air.

In the lagoons snowy herons joined other larger species at low tide, wading in shallows over the reefs in the bays, or at the borders of the lagoons, in water nearly up to their bodies. Where they are much hunted these birds are very wary and, seeming to appreciate that their white color renders them conspicuous, are the first among the herons to take alarm. When they leave they usually frighten the others. They may readily be distinguished from white immature specimens of *Florida c. cœrulescens*, as they have the tarsus black and the soles of the feet yellow, while in the little blue heron the tarsus is greenish. Frequently the snowy egret feeds in lowland cane fields, especially when these are wet or partly flooded. Often in flocks of three or four they feed in the dry upland pastures.

Food.—Two stomachs were available for examination, both of birds which had been feeding in mangrove swamps. The main content of these is animal matter, vegetable remains occurring only as rubbish secured with other food and amounting to but 1 per cent. One bird taken near Rio Piedras had eaten two dragon-fly nymphs, a small crab, a lizard, and a small frog. The stomach of the other, secured near Mameyes, was nearly filled with bones of small gobies, the remainder of the animal food consisting of fragments of flies of the family Dolichopodidæ and bits of a grasshopper. In their excursions to drier fields the birds must secure other insects. They feed to a large extent upon fish, but the fishes taken are of no great importance and the birds are not abundant enough to become noxious. They have been found worthy of protection in the United States, and the same course should be followed in Porto Rico in hope that they will increase in numbers, when they may assist in holding in check the destructive mole cricket.

EGRET. *Herodias egretta* (Gmelin).
GARZON BLANCO, GARZA REAL.

A few of the large egrets are still found in the lagoons of the coastal region of Porto Rico, but they are nowhere common. On February 14, while I was crossing Comezon Cove near Mameyes, a fine egret flew out from a nest in an isolated clump of mangroves. The nest was merely a loose platform of sticks about 20 feet from the water and contained one young bird and two addled eggs. On Piñero Island, near Fajardo, there was a colony of about 15 or 20, and these were said to breed there every year.

The birds usually are seen at low tide wading in the shallow lagoons in water well up to their bodies, where they work slowly along, looking for food; or are seen flying, two or three together, above the surface of the water. They are nearly always shy and hard to approach. Formerly much hunted for their plumes, they are now so few that the work does not pay, and they are molested only by occasional hunters.

Food.—The single stomach available for examination contained 4 per cent of vegetable rubbish taken as extraneous matter with the animal food. Remains of one mole cricket (*Scapteriscus didactylus*) and seven entire grasshoppers, with fragments of many more, were found, as well as a moth and three large dragon flies. A small goby and seven entire frogs (*Leptodactylus albilabris*), with fragments of others, made up 69 per cent of the contents. Orthoptera amounted to 15 per cent, a surprising fact and one that should be given due weight in considering the status of this species. The egret should be accorded the fullest protection or it will disappear entirely from the avifauna of the island. For its beauty and its destruction of injurious insects it is entitled to preservation.

WEST INDIAN GREAT BLUE HERON. *Ardea herodias adoxa* Oberholser.

Garzon Ceniciento, Garzon Cenizo.

The great blue heron is tolerably common in suitable localities in the coastal region, but apparently is merely a winter visitant. Gundlach (1878, p. 352) remarks on its nesting in the island in November and January, but gives no definite localities. It may be that the birds occasionally nest here, but the larger part of those found occur only in winter, and the summer stragglers may be nonbreeders. Only two were noted—at Guanica, May 26—though many favorable localities were visited. The few birds seen were shy, and it was difficult to approach them, as they have been hunted a great deal. Near Mameyes they passed much of the day in the more open portions of the mangrove swamps, where fiddler crabs (*Uca* sp.) were abundant, and they seemed to feed on them. At low tide they flew out to the shallow bays, beyond gunshot, to feed over the reefs, and kept a sharp lookout for intruders. Here they secured small fish and probably crabs. In some localities hunters prize this bird for the table, more because of its large size than its flavor. Although not known to be directly beneficial to agriculture in Porto Rico, it is worthy of protection, as it is not harmful under present conditions.

[GREAT WHITE HERON. *Ardea occidentalis* Audubon.

Garzon Blanco.

No actual specimens of the great white heron are recorded, though at one time it may have been found in Porto Rico at least occasionally. Gundlach (1878, p. 354) says that it was reported from various localities, and states that a white heron seen at the border of the Laguna de Guanica (Nov., 1873) was so large that it could have been no other species. Don Tomas Blanco also knew of it near San Juan. Stahl (1883, p. 64) lists it without comment, and later records in literature appear to follow these.]

LEAST BITTERN. *Ixobrychus exilis exilis* (Gmelin).

Martinete Chico, Martinete.

The least bittern is a resident species at present found only in a few localities along the coast. One was seen December 22 near Rio Piedras and at the Laguna de Guanica May 26 they were fairly common. Gundlach (1878a, p. 161) found them at Mayagüez, Arecibo, and along the Rio Toa at Dorado. One was taken at Porto Real (near Cabo Rojo) January 27, 1899, by Dr. J. D.

Milligan, of the U. S. S. *Fish Hawk.* At the Laguna de Guanica they are undoubtedly resident, as there are large areas of grassy marshes and many open stretches filled with growths of the water plants they prefer. Here the birds were rather wild and hard to approach, as they are molested a great deal by egg hunters. They are found in the grass where the water is from 1 to 2 feet deep and flush with dangling feet and outstretched neck. Almost at once the feet are drawn up, the head is doubled back onto the shoulders, and the birds fly off just above the vegetation, to drop back again when out of danger. When undisturbed, they sit quietly in the reeds or with long strides clamber rather awkwardly through them, grasping the stems in their slender toes. Gundlach (1878, p. 350) found a nest containing three eggs at Arecibo May 7. The bird seen at Rio Piedras was in a mangrove swamp, but as that is rather an unusual locality for them this individual may have been a migrant.

Food.—Three stomachs from the Laguna de Guanica contained nothing but animal matter. Remains of small fish in all the stomachs made up the large share of their contents (84.34 per cent). Crustacean remains in one formed 13.33 per cent, and a bit of an amphibian in one stomach figures as 0.33 per cent. Insect matter amounting to 2 per cent in two stomachs was made up entirely of fragments of aquatic Hemiptera. Quantities of feathers were found in all three stomachs, but they undoubtedly came from the bird itself. The bird thus seems to be about neutral from an economic standpoint. In its food habits this bittern can not be regarded as injurious, as little or no use is made of the small fresh-water lagoon fish, while the crustaceans taken may be considered as a point in its favor. The birds are too retiring to attract much attention, but should be placed in the protected class.

BITTERN. *Botaurus lentiginosus* (Montagu).
YABOA.

Gundlach (1878a, p. 161) secured a bittern in November, 1873, at the Laguna de Guanica and also records one (1874, p. 313) in the collection of Blanco at San Juan. Stahl had none in his collection, and as no other specimens are on record the species must be regarded as a casual migrant to the island.

[**GLOSSY IBIS.** *Plegadis autumnalis* (Linnæus).
COCO, COCO OSCURO.

The glossy ibis is included here, as Gundlach (1878, p. 366) mentions a drawing of it in the album of Dr. Bello, of Mayagüez. Later records by Gundlach and others are all apparently based upon this, so that it can be given only as a hypothetical species.]

WHITE IBIS. *Guara alba* (Linnæus).
COCO BLANCO.

Gundlach (1878, p. 364) did not find the white ibis on the island, but says that it was reported from the northeastern portion. Stahl (1883, p. 64) listed it without comment, but later (1887, p. 452) mentions it as a solitary species seldom found. Richmond (MS.) notes a specimen from Porto Rico in the Stahl collection in San Juan, and this is all that is known regarding its occurrence here. Formerly it may have been a resident species, but it is no longer found.

FLAMINGO. *Phœnicopterus ruber* Linnæus.
FLAMENCO.

The flamingo occurred formerly on Porto Rico and Culebra at least, and at an early date was fairly common. Now it is said to be found occasionally in the lagoons at Salinas and Aguirre, while stragglers are seen along the coast from Guayama to Ponce. In the extreme southwestern corner of the island about El Boqueron and in the lagoons below it, the birds are also reported. None were seen in the course of the present work. Gundlach (1878, p. 398) found them at El Boqueron and on the south coast, and remarks that they are said to be common on the east coast and on the off-lying islands. Ledru (1810, p. 209) mentions them from the River Loisa.

MASKED DUCK. *Nomonyx dominicus* (Linnæus).
PATO CHORIZO, PATO DOMINICA.

The masked duck is probably a rare resident in Porto Rico, though there are no recent records for it. Gundlach (1878a, p. 162) took it at the Laguna de Guanica and saw it in the collection of Hjalmarson at Arecibo (reported by Sundevall 1869, p. 603) and in that of Blanco in San Juan. Stahl (1883, p. 65) records one specimen in his cabinet as taken in Porto Rico.

RUDDY DUCK. *Erismatura jamaicensis* (Gmelin).
PATO CHORIZO.

Ruddy ducks appear to be regular migrants to Porto Rico, though I did not see any. Gundlach (1878, p. 407) remarks that he found them "hatching" at the Laguna de Guanica in November, 1873, but says nothing more regarding their breeding. At the time of my visit in May, 1912, the Bahama pintail (*Pœcilonetta bahamensis*) was common and the only duck nesting there. Gundlach (loc. cit., 403) did not record the Bahama pintail nearer than Boqueron and it is possible that he may have attributed nests or young seen at Guanica to the wrong bird. Stahl (1887, p. 453) also remarks that the ruddy duck breeds in Porto Rico, but may have been quoting Gundlach's record. More definite information is necessary in order to recognize the ruddy duck as a breeding species.

BUFFLE-HEAD. *Charitonetta albeola* (Linnæus).
PATO PINTO.

A specimen of the buffle-head was found by Richmond (MS.) in Stahl's collection of birds, which he examined in San Juan. This is the only record for the island, and the bird must be considered an accidental visitor there. The only other West Indian record is of a bird found in the market in Habana, Cuba (Cooke, 1906, p. 52).

RING-NECKED DUCK. *Marila collaris* (Donovan).
PATO DEL MEDIO, PATO SILVESTRE.

The only certain records for the ring-necked duck in Porto Rico are those of Gundlach (1878, p. 406), who saw a specimen taken in winter near San Juan by Blanco, and (1878a, p. 162) also mentions one taken by himself. Stahl (1883, p. 65) includes it in his list without comment.

LESSER SCAUP DUCK. *Marila affinis* (Eyton).
PATO DEL MEDIO, PATO SILVESTRE, PATO MORISCO.

The lesser scaup duck is a winter resident and is probably common. Many ducks are said to occur on the lagoons of Porto Rico, Vieques, and Culebra during the wintertime, and it is probable that they are largely this species. Gundlach (1878, p. 405) found them common at Boqueron and the Laguna de Guanica, and Stahl (1883, p. 154) had specimens in his collection taken probably near San Juan. The only place at which this species was certainly identified was at the Laguna de Guanica, where a crippled bird was taken May 26. A flock of about a dozen seen in the open water on the same date probably were of the same species. In April ducks apparently of this species were on a lagoon known as Flamenco on Culebra Island.

Food.—The stomach of the single bird examined contained fragments of a water boatman (*Corixa* sp.), two water scavenger beetles and the larva of another, bits of an undetermined beetle, and many fragments of dragon-fly larvæ, the last item forming 69 per cent of the contents. Six grass seeds (*Panicum* sp.) and bits of two other seeds formed vegetable matter to the amount of 4 per cent.

A close season for all ducks should be established similar to that recommended for the Bahama pintail.

[**PINTAIL.** *Dafila acuta* (Linnæus).
PATO PESCUEZILARGO, PATO SILVESTRE.

Gundlach (1878, p. 402) says that the pintail is a winter visitant and that one was taken near Arecibo by a friend of his but that he did not see the bird himself. There is no certain record.]

BAHAMA PINTAIL, BAHAMA DUCK. *Pœcilonetta bahamensis* (Linnæus).
PATO DE LA ORILLA, PATO CRIOLLO, PATO DE FLORIDA.

The Bahama pintail was noted on Culebra Island and at the Laguna de Guanica, but undoubtedly occurs in other favorable localities, especially in the winter season. Gundlach (1878, p. 403) found them at Boqueron and San Juan.

May 26 the birds were common at the Laguna de Guanica, where they would flush singly or in pairs from a growth of water plants covering a large area of the lagoon and, after circling over the open water, return to the same cover. Once in the short grass of a marsh a female flew out, but almost immediately fell back as though with a broken wing, repeating the performance several times. At the same time the low *peep peep* of young birds was heard and two about 5 days old were caught. A third promptly dived and apparently never came up, while the others rapidly scattered to safety through the grass. The down of these little birds was not at all soft, but had a peculiar stiff bristly feeling.

Food.—Stomachs of eight adults and two downy young which were collected were examined by W. L. McAtee, of the Biological Survey. The adults had eaten nothing but vegetable matter. Seeds of ditch grass (*Ruppia maritima*) were found in every stomach and formed 16.25 per cent of the total bulk, the largest amounts being 180 and 125 seeds, respectively. Foliage and antheridia of algæ (*Chara* sp.) made up 83.75 per cent and formed the great bulk in all the stomachs. The two downy young had eaten animal matter (amounting to 3.5 per cent), composed of remains of a water boatman (*Corixa* sp.), bits of a water creeper (*Pelocoris* sp.), and young snails. Grass seeds, foxtail grass (*Chætochloa* sp.), barnyard grass (*Echinochloa crus-galli*), and a species of guinea grass (*Panicum* sp.) formed 94 per cent of the food of these ducklings and a few other seeds 2.5 per cent.

These birds were much disturbed by egg hunters who were continually searching the marshes, and many were shot by gunners during the breeding season. They should be free from molestation from March 1 to December 1 at least. In a few years their range will be even more restricted than at present, because of the draining and clearing of swamps and marshes, and unless protected they will disappear entirely.

SHOVELER. *Spatula clypeata* (Linnæus).
PATO INGLES, PATO CUCHARETA.

The shoveler is, from all accounts, a tolerably common winter visitor in Porto Rico. Gundlach (1878, p. 404) says that it is found from fall until

April, and there are several specimens on record. (Sundevall, 1869, p. 603; Stahl, 1883, p. 153.)

BLUE-WINGED TEAL. *Querquedula discors* (Linnæus).
PATO DE LA FLORIDA.

According to all reports this is a common winter visitant, being the most familiarly known duck, though I saw none. Gundlach (1878, p. 404) writes that it is abundant, arriving in September. There are also numerous records of specimens. It is to be looked for in fresh-water marshes and charcos as well as in larger lagoons.

BALDPATE. *Mareca americana* (Gmelin).
PATO LABLANCO.

The baldpate is a rare winter visitant in Porto Rico, being reported as occasional by duck hunters. Sundevall (1869, p. 603) records a young male sent him by Hjalmarson, and Gundlach (1878a, p. 162) secured a specimen, but assigns no definite locality.

BLACK-BELLIED TREE DUCK. *Dendrocygna autumnalis* (Linnæus).
YAGUAZA, CHIRIRIA.

The tree duck is well known to all Porto Ricans, but apparently has become very rare, as I did not see one. Taylor (1864, p. 172) found them abundant, and later authors record them as common, but they apparently represent a vanishing species. The species still exists, without doubt, in small numbers and needs absolute protection for a period of years if it is to be preserved as a game bird. The clearing and draining of many of the swamps has done much toward reducing its numbers by depriving it of cover. Gundlach (1878, p. 400) says that the birds feed at twilight, spending the day sleeping or under cover, and that they lay from 12 to 14 eggs. Sundevall (1869, p. 603) records them as nesting commonly in the island.

[**GREATER SNOW GOOSE.** *Chen hyperboreus nivalis* (J. R. Forster).
GANSO BLANCO, GUANANA.

It is said that white geese are occasionally found in fall on the lagoons at Manati and that they are sometimes killed. Thus they may be rare winter visitants. Gundlach (1878a, p. 190) heard of one captured at Isabela, while Stahl (1883, p. 65) merely remarks that they are rare. No authentic specimens are on record, so that the bird is included here as a hypothetical species.]

TURKEY VULTURE. *Cathartes aura aura* (Linnæus).
AURA, AURA TIÑOSA.

In the dry limestone hills above Guanica the turkey vulture was fairly common. It appeared to range casually from Añasco to Yauco, keeping near the coast, though once reported from the summit of the Mata Platano above Adjuntas. The species is said to have been introduced from Cuba into the southwestern part of the island by the Spanish Government (some say, incorrectly, by the Guanica Centrale), the exact date not being known. An old man near Yauco who had known them since boyhood stated that their numbers had neither increased nor decreased in that time. On one occasion 16 were counted circling over a dead bird, and as in such a small area all the birds present would be attracted by the circling of a flock their total number was certainly less than 25. There is no apparent reason for their not having increased and spread at least the entire length of the dry south coast, as the conditions there are apparently as favorable as in this region. Their beneficial habits are well known to the country people, so that they are not molested. Probably their only enemy is the mongoose.

Gundlach (1874, p. 307) says emphatically that the turkey vulture was not found in Porto Rico, so that we may consider it as introduced since his travels on the island, as he visited the region about Guanica in November, 1873. A. B. Baker (MS.) saw several during the latter part of January, 1899.

PORTO RICAN SPARROW HAWK. *Falco sparverius loquacula* Riley.
FALCON.

Dry areas with a rather open brush growth, as on the south coast of Porto Rico, were apparently very favorable to the Porto Rican sparrow hawk, and in some of these localities the birds were almost abundant. On Porto Rico a few were found scattered through the coconut groves along the coast, but they were more common in the foothills, and inland on the north coast few were seen below 1,000 feet elevation. They are also common on Vieques and Culebra. Few were found in the cane fields, as commanding perches from which to watch for food were lacking, but they were common about openings in the coffee plantations.

Sparrow hawks began to breed about April 1 and were nesting through May and June. Many young birds under their parents' care were found during July and August, when they remained quiet in perches shaded from the glare of the sun, chiefly in the coffee plantations. When abandoned by the adults, the young birds were very noisy and restless, giving voice to their displeasure continually. The nests were in cavities in palms and other trees. Many adults taken during the breeding season had the tips of the rectrices much abraded from wear in the nesting cavity or from bracing on the tree trunks before the entrance. A female taken near Salinas, April 30, contained an egg almost developed. Fragments of the shell were whitish with scattered cinnamon spots, but whether or not all of the color had been deposited could not be determined. Three young were the greatest number observed in one party, though Gundlach (1878, p. 163) says that from three to five eggs are laid. The birds uttered a sharp *killy killy killy*, and during the early part of the nesting season especially were very noisy. On Culebra Island one was seen pursuing a red-tailed hawk and screaming shrilly.

From field observations these little hawks fed largely on lizards picked up easily from the ground or captured on fence posts, stumps, or tree trunks. One taken at the old naval encampment on Culebra Island had eaten a common house mouse. Sparrow hawks were seen on several occasions in pursuit of woodpeckers, doves, or yellow-shouldered blackbirds, but none were observed eating or holding birds that were certainly identified as such. A. B. Baker (MS.) saw one strike an ani in a bush and bear it to the ground. Ground doves were the only birds that showed great fear of them. Near Quebradillas on July 3 a sparrow hawk swung down under an overhanging ledge with a low chattering call and examined several cliff swallows' nests, but they were apparently empty.

Food.—Forty-eight stomachs of the sparrow hawk were examined, taken from January to August, inclusive. Animal food made up 99.68 per cent, and vegetable 0.32 per cent. The vegetable matter, composed entirely of rubbish, was found in three stomachs and need not be considered, as it was not actually taken as food.

Mole crickets (*Scapteriscus didactylus*) were found in 17 stomachs and made up 28.69 per cent of the total food. One bird had eaten four of these destructive insects, another three, and several had taken two. They were found in every month represented, except August, and occurred constantly in a large series collected in March and April. Other Orthoptera formed 20.86 per cent and were composed mainly of locusts (Acrididæ) with a good many katydids (Locustidæ).

Remains of small birds in two stomachs amounted to 1.88 per cent. One stomach contained portions of a Porto Rican grosbeak (*Loxigilla portoricensis*) and another a small black feather only; there is evidently some basis for the fear shown these hawks. House mice (*Mus musculus*) were found in eight stomachs and formed 5.59 per cent. They were noted in stomachs taken in March, April, and May only. The only real criticism of this small hawk is its large consumption of lizards, amounting to 40.4 per cent of its entire food. One ameiva (*Ameiva exul*) was taken, but the great mass was made up of the ever-abundant anolis, of which four species were definitely identified (*Anolis cristatellus*, *A. gundlachi*, *A. krugi*, and *A. pulchellus*). Unless of small size, they were usually pulled in two before being swallowed. Miscellaneous animal matter composed largely of spiders amounted to 2.26 per cent.

Under present conditions the sparrow hawk must be considered a valuable species, as it feeds so largely on the changa or mole cricket. Although many lizards, whose food is entirely insects, are taken, their numbers are so great that no impression is made upon them.

The number of mice eaten illustrates to what extent these rodents have overrun the island. The sparrow hawk is not large enough to attack rats, except, perhaps, young animals. To encourage the birds about cane fields occasional high perches from which they can watch for prey should be provided along the fences. Their numbers should increase in the lowland region, as their natural food is abundant and easily obtained.

PIGEON HAWK. *Falco columbarius columbarius* Linnæus.
GAVILAN.

The pigeon hawk is a rare winter visitant to Porto Rico. Sundevall (1869, p. 601) received a single specimen from Hjalmarson, of Arecibo. Gundlach (1878, p. 162) saw one at the Laguna de Guanica and secured a female at Quebradillas. Stahl (1883, p. 136) had specimens in his collection, and Richmond (MS.) notes that a small hawk seen at the Hacienda Catalina, in March, 1900, may have been of this species. None were seen by me. It is fortunate that this little falcon is not more common, as it is one of the few species found that are injurious, its food being made up largely of small birds.

DUCK HAWK. *Falco peregrinus anatum* Bonaparte.
GABILAN, HALCON DE PATOS.

Gundlach (1878, p. 161) notes seeing a duck hawk repeatedly at the Laguna de Guanica in November, 1873, where it was feeding on ducks and coots. Stahl (1883, pp. 58, 136) found this species about the lagoons and had a female from Porto Rico in his collection. It is apparently a rare winter visitant, following the migrating water birds, and while not abundant enough to be of much damage should not be protected. Its food is almost entirely birds of various species.

BROAD-WINGED HAWK. *Buteo platypterus platypterus* (Vieillot).
GUARAGUOU DE SABANA.

The broad-winged hawk was formerly a common resident, mainly in the interior, according to Gundlach (1878, p. 160), who secured specimens. Richmond (MS.) saw one near Utuado April 6, 1900, and identified it certainly. This is the only recent record for the bird. Stahl (1883, p. 58) undoubtedly erroneously considered it a migrant. Gundlach (loc. cit.) reports its food as small reptiles, large insects, and birds. I did not see this hawk during my stay on the island and it is very rare at present.

RED-TAILED HAWK. *Buteo borealis* (Gmelin).
GUARAGUOU, GUARAGUOU DE SIERRA, LECHUZA.

Wherever there are steep hilltops still covered with second-growth forest to furnish safe retreats and nesting places, red-tailed hawks are a tolerably common resident species. These birds had the same call notes and habits as the northern forms, but were seldom seen except at a distance. Much persecution has made them wary, but so long as they have safe retreats they will continue to exist.

On January 18 one was seen carrying nesting material in the mountains above Cayey and a nest seen on Vieques Island the middle of March was said the week before to have contained two young two-thirds grown. Young birds were noted in July and August and an immature specimen was taken near Manati July 11. The birds were most active before 9 o'clock in the morning and after 3 in the afternoon, spending the heat of the day perched on dead trees.

Throughout the country these hawks are universally credited with eating chickens, though no specific instances were noted by the writer. Near Yabucoa one man claimed to have lost eight in a week. Before man's advent in this region the food of this bird must have consisted of lizards, snakes, and birds, as there were apparently no mammals except bats on the island. The present custom of allowing chickens to run in the fields and coffee plantations at considerable distances from houses leaves them open to attack, and there is not much doubt that a few at least are taken. Bowdish (1902–3, p. 361) notes the remains of rats in the only two stomachs examined by him. Land holders all conceded that the hawks ate many rats, and some that they ate crabs and lizards also. The country people secure the young hawks for food whenever possible.

From the few specimens at hand it is not possible to determine whether this species is allied to the Jamaican bird, or whether it is sufficiently distinct to merit a new name.

Food.—Two stomachs only of this species were examined and one was entirely empty. The other contained the hind quarters of a good-sized rat (*Epimys* sp.), evidence in favor of the bird. Where individuals form the habit of eating chickens they should unquestionably be killed, but otherwise should not be molested.

PORTO RICAN SHARP-SHINNED HAWK. *Accipter striatus venator* Wetmore.[1]
FALCON.

On May 30 a small hawk, which proved to be a new form, was taken at an elevation of about 1,500 feet back of Maricao. It came sailing overhead with something, presumably a bird, in its talons, and was mistaken at first for a sparrow hawk. Another individual was noted the same day, and on June 4 still another was seen in a dead tree eating a small bird. When shot this bird fell down a steep slope and was lost. Apparently these hawks are not only rare but are local, as the genus has not been recorded on the island up to this time, and individuals were found in this one locality only. Here they were frequenting steep slopes densely covered with coffee, while certain low mountains farther inland, covered with an almost impenetrable second growth, also may have harbored them.

Food.—From the foregoing it would seem that the food was mainly small birds, so that the species must be considered as injurious, though in the case of a bird numerically so weak this can hardly be considered of importance. The single stomach examined contained fragments of a Latimer's vireo (*Vireo*

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[1] Proc. Biol. Soc. Washington, XXVII, 1914, pp. 119–122.

latimeri) as well as a few feathers of a honey creeper (*Cœreba portoricensis*), thus substantiating field observations.

OSPREY. *Pandion haliaëtus carolinensis* (Gmelin).
AGUILA, GUINCHO, AGUILA MARINA.

The osprey is apparently a rare winter visitant to this region. Bowdish (1902–3, p. 361) notes two from Vieques and one from Mona, while Gundlach (1878, p. 158) includes it on the authority of Blanco. Stahl (1883, pp. 58, 136) recorded it as a migrant about the mouths of rivers and had one specimen in his collection. Along the coast near Mameyes I saw several during February perched on stakes in the water or circling over the shallows and occasionally visiting swampy lagoons inland; one was seen on Culebra April 8 and another April 17. The osprey lives entirely on fish, but it is not numerous enough to be of economic importance.

GUINEA HEN. *Numida meleagris* Linnæus.
GALLINA DE GUINEA, GUINEA.

The guinea hen, formerly common in the forests, has become wild in Porto Rico as in the other Greater Antilles. Gundlach (1878, p. 352) records the birds as common, and says that their food consists of seeds, wild fruits, maize, rice, sweet potatoes, and plantains, and that sometimes they cause considerable damage to the latter crop. Ledru (1810, p. 207) says that the guinea hen was brought to Porto Rico by the Genoese slavers about the year 1508. Stahl (Richmond MS.) secured a specimen at Cabo Rojo many years ago, and Sundevall (1869, p. 601) says that they were not rare. At present they are confined to natural forest areas, as the Cerro Gordo near Maricao, in Caguana, near Barros, and on El Yunque de Luquillo. They are few in number and so wild and retiring that to secure them is largely a matter of chance. Formerly they were considered game birds and hunted systematically. With the clearing of the land and the loss of cover, only a small number will survive, and these in the most inaccessible regions. They are described as being darker than the domestic guinea hen and with a differently marked head.

CUBAN QUAIL. *Colinus virginianus cubanensis* (Gould).
CODORNIZ.

The Cuban quail was introduced into Porto Rico by Don Ramón Soler in the Hacienda Santa Ines near Vega Baja about 1860 (?) (Gundlach, 1878, p. 350). Stahl (1883, p. 149) had two specimens in his collection, and Hjalmarson also secured some (Sundevall, 1869, p. 601). Bowdish (1902–3, p. 360) saw one on a hill near Mayagüez, but now the bird is apparently extinct. I could not learn of any seen recently.

AMERICAN COOT, MUD HEN. *Fulica americana americana* Gmelin.
GALLINAZO, GALLARETA, YAGARETA, DAGARETA NEGRA.

The coot is found in Porto Rico, usually in flocks on the large lagoons. Many individuals appear to be migratory, but the species as a whole is resident. They were noted as very common on the Laguna de Guanica and on the large lagoon north of Manati. Two birds were seen on Culebra April 13 and 19, respectively. On the Laguna de Guanica May 26 a large number were apparently breeding. The country people searched the marshes systematically for their eggs, so that few escaped. On a large lagoon north of Manati and Vega Baja on July 9 a flock of 300 or 400 was noted, many of them young birds.

Food.—A coot taken on Culebra had eaten a water scavenger beetle, a number of small crustaceans, and a large mass of eggs belonging probably to other crustaceans. Bits of wood and other vegetable matter were present in small quantities. A bird from Guanica, taken in May, had eaten a large quantity of grass or sedge, with a few small roots.

The coot, while not ranking high as a game bird, possesses some economic value as such in a region where true game birds are scarce, as in Porto Rico. It merits protection, therefore, during the breeding season, from March 1 until October 1, at least. Nest robbing is at all times a pernicious practice, and if taking eggs of coots be permitted, ducks' nests will inevitably suffer at the hands of men who do not care to distinguish between them.

[**CARIBBEAN COOT.** *Fulica caribœa* Ridgway.
GALLARETA.

The only record of the Caribbean coot is that of Cory (1892, p. 91), who assigns it to Porto Rico without comment or definite record. It is distinguished from the common coot by having a broad red frontal plate on the head. At present it can be considered only of doubtful occurrence.]

FLORIDA GALLINULE. *Gallinula galeata galeata* (Lichtenstein).
GALLARETA DE AGUA, YAGARETA, DAGARETA, GALLINAZA.

The Florida gallinule is resident in Porto Rico, though there is apparently some migration among individuals. It is found in quiet water near the mouths of large rivers where there are suitable growths of water plants for cover and in fresh-water marshes and sloughs. April and May appear to be the breeding months, as young about 5 days old were seen near Yabucoa May 8.

In the marshes and rivers these gallinules are seen frequently swimming across open stretches of water, or when encountered suddenly in rounding a bend fly up and away, singly or in pairs. If a female with her young is disturbed she will remain almost within reach, calling excitedly until the chicks are safe. Where gallinules are common they are heard cackling and calling on all sides and their notes are the dominant sounds of the marsh. Sometimes one will clamber up the reeds and balance near their tips, clucking excitedly, but usually once they are safe in the growth of water plants they can not be seen even a few feet away. The birds are somewhat pugnacious among themselves, especially during the breeding season, and may be seen darting at one another with open bills.

In the Laguna de Guanica the country people hunted for their eggs, examining every clump of grass or reeds and working the ground so systematically that it is a wonder any remain. The birds should be rigidly protected during the breeding season, as they are of some value as a game bird in a country where game is scarce.

Food.—Vegetable matter forms the main sustenance of this gallinule, as four stomachs taken in May contained 96.75 per cent, while only 3.25 per cent of animal matter was present. A single stomach taken in April held what appeared to be crustacean eggs to the amount of 95 per cent, but this may be exceptional. The other food taken by this bird was vegetable matter, mainly grass.

Bits of a true bug (lygæid) were found in one stomach and a small back swimmer (*Plea striola*) in another. Beetles of the water-scavenger family occurred in two stomachs, part of a weevil root-borer (*Diaprepes spengleri*) in another, and fragments of two small Hymenoptera in a third. One bird had eaten three snails (*Paludestrina coronata*) and two small bivalves (*Myctilopsis leucopheata*).

Grass and rootlets formed 90.75 per cent of the total contents, and seeds made up 6 per cent. Among those identified were knotweed (*Polygonum* sp.), many grass seeds (*Panicum* sp., *Paspalum virgatum schreberianum*), white-top (*Dichro-*

mena ciliata), fimbristylis, purslane (*Portulaca oleracea*), pigweed (*Amaranthus* sp.), cadillo altea (*Triumfetta* sp.), and heliotrope (*Heliotropium indicum*).

A native living near some sloughs below Yabucoa charged these birds with destroying and eating the gonduros (*Cajanus cajan*) in her garden, but I heard no other complaint against them, and they may be considered harmless.

PURPLE GALLINULE. *Ionornis martinicus* (Linnæus).
GALLARETA PLATANERA, GALLARETA MARTINIQUEÑA, GALLARETA, DAGARETA.

Gundlach (1878, p. 392) says that the purple gallinule was common in the seventies and damaged rice by eating the grain and breaking down the stalks. Taylor (1864, p. 171) also found it very abundant in suitable localities, and Sundevall (1869, p. 601) received seven specimens from Hjalmarson. Now, however, these gallinules are rare, and the only recent record available is that of Dr. C. W. Richmond (MS.), who saw one March 3, 1900, near Luquillo, walking about on some mangrove roots. Gundlach (loc. cit.) says that they build a nest like that of the Florida gallinule and lay from 6 to 10 eggs.

BLACK RAIL. *Creciscus jamaicensis* (Gmelin).
GALLARETILLA.

The black rail was first recorded for Porto Rico by Gundlach (1881, p. 401) from a bird taken by Stahl. The latter (1883, p. 63) considered it a rare visitant, and says (1887, p. 452) that it is found in swampy places and that young were taken. Dr. Richmond (MS.) examined a specimen from Porto Rico in the Stahl collection in San Juan, presumably the bird upon which the original records are based.

SORA, CAROLINA RAIL. *Porzana carolina* (Linnæus).
GALLINUELA, GALLARETA DE CIENAGA, DAGARETILLA.

The sora is a winter visitant (from October until April) and is found in fresh-water swamps. I did not see the bird, but it is recorded by all the early naturalists. The most recent record is that of Dr. C. W. Richmond (MS.), who examined one taken at Luquillo March 5, 1900. The bird is known to many natives.

YELLOW-BELLIED RAIL. *Porzana flaviventris* (Boddaert).
GALLARETILLA.

The yellow-bellied rail is a rare resident, formerly rather common. May 26 in the marshes at the head of the Laguna de Guanica two were flushed from a growth of water plants bordering a small open pond about 2 feet deep. They got up quickly, flew high and swiftly, for rails, and then dropped and were lost in a dense growth of rushes. On July 23 two more, one an immature bird, flew up from the water plants fringing a small pond along the Bayamon River near Bayamon and dropped over into the denser growth. Gundlach (1878, p. 391) found them along the Rio Arecibo. These birds undoubtedly occur in other localities, but from their retiring habits escape notice. They appear to inhabit fresh-water marshes where the water is fairly deep, hiding in the dense vegetation. They are too small to be considered as game birds, even if their scarcity did not preclude hunting them systematically for sport.

CARIBBEAN CLAPPER RAIL. *Rallus longirostris caribæus* Ridgway.
POLLA DE LAGUNA, POLLA DE MANGLE, POLLA DE MANGLAR.

The Caribbean clapper rail is apparently not found except on salt water. It is a common species resident in the coastal region, occurring only in the wet mangrove swamps bordering the bays and brackish lagoons.

The bird is very shy and inhabits the densest swamps. On Culebra April was apparently the beginning of the breeding season and the rails were heard constantly. Near Mameyes one was seen slipping like a gray shadow between the roots at the edge of a lagoon.

In the region known as La Playita, near Salinas, clapper rails were abundant and by May 2 some had young a week old, while others were still laying. In the lower part of the swamps they were heard calling constantly and their tracks were seen everywhere in the soft mud. They fed through the more open parts of the mangroves here, sometimes darting across openings or even swimming across small pools of water. When caught in small isolated clumps of mangroves in deep water they frequently flew just above the water with a slow direct flight, rather than swim to safety. They ran swiftly, covering the ground with long strides, sometimes pausing when in the shelter of the mangroves to look back and see what startled them. One female followed by six or eight coal-black young was seen in a small opening, but at a slight noise all disappeared. One young bird taken was entirely black and had stocky legs and big feet.

Food.—Eleven stomachs of the clapper rail were examined and the food was found to be entirely animal matter. A small quantity of vegetable rubbish found in one stomach was without doubt taken accidentally and may be disregarded. Two stomachs were entirely empty, leaving nine available for study. Only one contained fish remains and the others, with the single exception of the small amount of vegetable matter noted, were filled with remains of crustaceans usually finely ground. The great mass of these were identified as fiddler crabs (*Uca pugnax rapax*) and they formed the entire contents of six of the stomachs examined and occurred in seven of the nine. Other crustacean remains, together with these crabs, form 94.45 per cent.

This bird is of value as a game bird and from its habits is capable of holding its own so long as the mangrove swamps remain. It should, however, be protected from March 1 to December 1, at least.

LIMPKIN, COURLAN. *Aramus vociferus* (Latham).
CARRAO, GUAREAO.

Although reported from many localities, the carrao, or limpkin, can be recorded certainly only from the north slopes of El Yunque above Rio Grande, the region between Adjuntas and Maricao, and the Hacienda Jobo west of Utuado. It is apparently unknown on the smaller islands and is now very rare on Porto Rico. Formerly more abundant, it was highly esteemed as a game bird. Gundlach (1878, p. 387) records it as common and nesting from the end of December through January, laying from three to five eggs. He describes its food as consisting of mollusks, earthworms, insects, crustaceans, and land shells.

In Porto Rico the limpkin inhabits dense wet forest growth in remote localities and occurs usually on steep slopes, frequently at some distance above the streams. It is said to be found in pairs, and when hunted the birds run rapidly and noiselessly before the sportsman, rarely flying, seeking the densest cover. Only in early morning do they come out into the more open forest. The natives are said to pursue them on foot through the wet growth. Soon the birds' feathers become too wet for flight, and in a short time, when tired out, they may be captured in the hand. The native name is given to the bird in imitation of its cry.

The main part of the food is said to be the common large land shells (*Pleurodonte caroçalla*), and to some extent lizards.

The clearing of the forest has done much to lessen the numbers of this bird, while the mongoose without doubt takes its full share, living, as it does, upon the ground; so that the limpkin is no longer valuable as a game bird, though scattered individuals may survive for many years. Mr. Leop. B. Strube, of the Hacienda Jobo, stated that there were still at least a dozen pairs on his plantation living in a small tract of natural forest, and as they are protected they will survive. Mr. Strube kindly presented the Biological Survey with a specimen taken in June in that locality.

MEXICAN JACANA. *Jacana spinosa* (Linnæus).
GALLITO.

Gundlach (1878, p. 385) says that Blanco received a specimen of the Mexican jacana in the flesh from Trujillo. There are no other records, and the bird must be regarded as an accidental visitant.

OYSTER-CATCHER. *Hæmatopus palliatus* (Temminck).
CORACOLERO, OSTRERO.

The oyster-catcher is reported as occurring occasionally on the islands of Culebra and Culebrita. Gundlach (1878, p. 379) reports a specimen on the authority of Blanco, taken near San Juan, and Stahl (1887, p. 449) says that it was seen at the end of August, 1886. On the rocky beaches of Desecheo, June 13 to 15, three were seen and others reported by fishermen, to whom they are well known. From an economic standpoint this bird has no importance whatever, but is worthy of protection because of its harmlessness.

RUFOUS-NAPED PLOVER. *Ochthodromus wilsonius rufinuchus* (Ridgway).
CORREDOR, FRAILECILLO CABEZON, PLAYERO, PLAYANTE.

Gundlach (1878a, p. 189) found the rufous-naped plover at Cabo Rojo and Arecibo in October and February and says (1878, p. 381) it is resident. Stahl (1883, p. 63) also considered it a resident species and says emphatically that it does not migrate. There is a specimen in the United States National Museum, taken February 11, 1899, on Culebra by Dr. J. D. Milligan. Bowdish (1902–3, p. 360) found these plovers on Vieques during November. Dr. Richmond secured specimens in the same locality on March 27, 1900. The bird is now rare, and none were seen during my work in this region.

PIPING PLOVER. *Ægialitis meloda* Ord.
PLAYERO, PLAYANTE, FRAILECILLO MELODICO.

Gundlach (1874, p. 314) saw a piping plover in the Blanco collection, taken near San Juan. Stahl (1883, p. 152) had two specimens (examined in 1900 by Dr. Richmond) from Porto Rico, and says (1887, p. 449) that the birds arrive the middle of August. The bird seems to be a rare migrant to the island.

SEMIPALMATED PLOVER. *Ægialitis semipalmata* (Bonaparte).
PLAYERO, PLAYANTE, FRAILECITO, FRAILECILLO CHICO.

The semipalmated plover is at present apparently rather a rare migrant. One was seen on the north coast of Vieques March 30, but was not secured. Gundlach (1878a, p. 189) records it as common in September at Mayagüez and as occurring in April, May, and June, while Sundevall (1869, p. 602) notes a specimen taken by Hjalmarson in winter. Stahl (1883, p. 152) had three specimens in his collection, one of which was examined in San Juan by Dr. Richmond (MS.), who also collected specimens March 5, 1900, at Luquillo, which were not preserved. Stahl (1887, p. 449) notes that they arrive the middle of August.

ANTILLEAN KILLDEER. *Oxyechus vociferus rubidus* Riley.
PLAYERO, PLAYANTE, PLUVIAL SABANERO, FRAILECILLO SABANERO.

The Antillean killdeer is a resident species, common locally in the coastal region. In July, after the breeding season, it goes inland along the larger streams as far as Utuado, Ciales, and other inland towns.

In February these killdeer seemed to be paired (Mameyes), and on March 23 on Vieques a female taken along a small stream contained an egg nearly ready for the shell. A young bird secured near Añasco June 7 had down feathers still clinging to the tips of the rectrices. During the breeding season the birds frequent mainly the dry open shores of lagoons near the coast, but the rest of the year wander a great deal. In the sandy region north of Manati they are very common and numbers frequent the citrus groves, apparently breeding there. In such localities the birds are well worthy of protection while nesting, because of their beneficial habits, and insectivorous birds in the orchards are few.

The birds are, as in the North, noisy and restless, and about the lagoons frequently alarm other waterfowl with their loud cries. During the breeding season their outcries are doubled, and in regions where they have nests or young they may be seen continually flying overhead, or running along on the ground, always with their loud notes, stopping to fall on their breasts with outspread fluttering wings or to simulate a brooding bird covering her eggs. After the breeding season many are found along the broad gravel bars of the larger streams.

Food.—Twenty stomachs of the killdeer taken in February, March, May, June, and July were examined, and showed 98.34 per cent animal matter and 1.66 per cent vegetable. Orthoptera, beetles, flies, and snails make up the bulk of the animal food, and the small percentage of vegetable matter is composed mainly of seeds, with a little rubbish.

Animal food.—The killdeer proves to be an important enemy of the mole cricket. It was found in 10 stomachs and forms 14.42 per cent of the food. Nymphs only appear to be eaten, as the bird can not break up the adults in order to swallow them, but this in no wise lessens the value of its services. Seven changas were found in one stomach, six in another, and several stomachs contained three each. Other Orthoptera amounted to 2.04 per cent, and were made up of miscellaneous fragments, among which were identified two small crickets (*Ellipes minuta*). Weevil remains (3.09 per cent) were recognized in four stomachs. The only one determined was a curculio (*Erodiscus* sp.). Other beetles make 29.17 per cent, the largest single item in the dietary of this bird. Water scavenger beetles (*Berosus* sp. and *Philhydrus* sp.) were found eight times, and a small dung beetle (*Atœnius stercorator*) seven times. Darkling beetles (Tenebrionidæ) were taken by six birds, and though not of much importance economically, they are of interest as showing that in Porto Rico as in the southwestern United States there are a number of ground-haunting forms of this family. Only one genus (*Crypticus*) was identified. The striped flea beetle (*Systena basalis*), injurious to nearly all garden vegetables, was found twice, and a corn leaf-eating beetle (*Myochrous* sp.) four times. The habits of the latter species in Porto Rico are not known, but in the Southern States they damage young corn by eating the leaves. Another flea beetle (*Haltica* sp.) was found in one stomach. All of these leaf-eating beetles are more or less noxious and in many cases become very injurious. Only one ground beetle (*Selenophorus* sp.) was found, and this was the only beneficial insect taken.

Fly larvæ occurred in seven stomachs, and comprised 19.53 per cent of the contents. Ants form 5.59 per cent, and were found in ten stomachs. The fire ant or brown ant (*Solenopsis geminata*) had been eaten by seven birds, one stomach containing 41, another 56, and another 83 individuals. This ant is known to be very injurious to young orange trees, so that the killdeer at once becomes of importance in the citrus groves. One broad-shouldered water strider (*Microvelia* sp.) and a single water boatman (*Corixa* sp.) were found. One stomach contained 12 caterpillars and another an ichneumon fly. These miscellaneous items form 1.56 per cent.

Dragon flies occur in two stomachs taken in July, and form 3.92 per cent of the total. Mollusks figure as 19.02 per cent, and among them three genera were identified (*Truncatella, Planorbis,* and *Paludestrina*). One stomach contained a few fish remains.

Vegetable food.—Though amounting to only 1.66 per cent of the total, vegetable matter was found in nine stomachs; in only two was there material that could be classed as rubbish. Each of the other seven held small seeds, among which were identified guinea grass (*Panicum* sp.), crab grass (*Syntherisma sanguinalis*), white-top (*Dichromena ciliata*), pigweed (*Amaranthus* sp.), purslane (*Portulaca oleracea*), knotweed (*Polygonum* sp.), plantain (*Plantago* sp.), croton (*Croton* sp.), and several seeds of composite plants. The large share of these are weed seeds growing abundantly in the haunts of this killdeer.

Although small, the Antillean killdeer might be considered a game bird, but its food habits warrant giving it full protection and encouragement, as its services to the agriculturist are too valuable to be lost. It is especially useful in cultivated fields and orchards. Analysis of its food shows that it is entirely beneficial, and from its habits it can perform services not rendered by other birds.

GOLDEN PLOVER. *Charadrius dominicus dominicus* (Müller).

PLAYERO, CHORLITO, PLUVIAL.

The golden plover is apparently a rare migrant through Porto Rico. Sundevall (1869, p. 602) speaks of two specimens sent him by Hjalmarson. Gundlach (1878a, p. 189) secured specimens near Arecibo in November, and Stahl (1883, p. 152) had two in his collection. One bird was seen feeding along the beach near the mouth of the Rio Mameyes February 16, but was not secured. There are no other records for this bird.

BLACK-BELLIED PLOVER. *Squatarola squatarola* (Linnæus).

PLUVIAL, PLUVIAL GRANDE.

Gundlach (1878a, p. 188) secured specimens of the black-bellied plover around San Juan Bay, and Stahl (1883, p. 152) had two specimens from Porto Rico in his collection. There are no other actual records for the bird, and it must be regarded as a rare migrant.

RUDDY TURNSTONE. *Arenaria interpres morinella* (Linnæus).

PLAYERO TURCO, PUTILLA TURCA.

Gundlach (1878, p. 379) records the arrival of the ruddy turnstone in September and says it remains until May. He found the species (1878a, p. 188) at Mayagüez, Cabo Rojo, Quebradillas, and Vega Baja. It is a winter visitant apparently tolerably common. On February 15 a small flock was seen by the writer feeding along the mud flats on Punto Miquillo north of Mameyes, and the same flock was observed again on the 21st. The birds kept close together on the ground, and when startled got up with a loud whistled note, flying in a compact flock. They were well known to fishermen and charcoal burners near Mameyes, and were said to occur regularly. On April 15 three or four were seen on Culebrita Island. This species occurs only where there are mud flats suitable for it to feed upon, and only in the immediate neighborhood of the coast on either brackish or salt water.

Food.—Five stomachs of the turnstone taken in February and April were examined and were found to contain animal matter only. One contained a few small fish scales, but small crustaceans made up the bulk of the food. The greater part of these were amphipods (*Orchestia* sp.), while a smaller number of isopods (*Excirolana mayana*) were eaten. No other groups could be identified. Nothing is eaten that is beneficial or injurious to man.

ESKIMO CURLEW. *Numenius borealis* (J. R. Forster).
CURLIS, CHORLO.

The only record for the Eskimo curlew is that of Gundlach (1878a, p. 188), who mentions a single specimen taken near San Juan by Don Tomas Blanco.

HUDSONIAN CURLEW. *Numenius hudsonicus* Latham.
CURLIS, BARGA, CHORLO.

Gundlach (1878a, p. 187) saw the Hudsonian curlew in the collection of Blanco in San Juan, and (1878, p. 367) says that he once found this bird along the river at Punta Arenas south of Mayagüez. Stahl (1883, p. 150) recorded two specimens in his collection and these were seen in San Juan in 1900 by Richmond (MS.).

SPOTTED SANDPIPER. *Actitis macularia* (Linnæus).
PUTILLA, PLAYERO, PUTILLA MANCHADA, ZARAPICO MOSQUEADO.

A common winter visitant from July to May, the spotted sandpiper is the most abundant and widely distributed shorebird in the island.

It frequents the mangrove swamps, borders of lagoons, margins of all the streams, and occasionally the sandy beaches. During the winter season it follows inland along the small streams and occurs throughout the island. The first fall bird taken (at Manati July 9) was an adult, and none but adults were seen until July 27, when immature birds were common along the Rio de la Plata above Comerio. The last bird in the spring was seen near Patillas May 13. Thus the bird is present in the island 11 months of the year, though it does not nest there.

Food.—Nine stomachs of the spotted sandpiper representing the months from December to April, and July and August were examined. Animal matter comprised 99.78 per cent of the food, leaving only 0.22 per cent for vegetable matter, which consisted of rubbish found in two stomachs. The greater share of the food is made up of crustaceans, with smaller amounts of mole crickets, bugs, and beetles. Though mole crickets (*Scapteriscus didactylus*) were found in but two stomachs, they form 10.78 per cent of the total food. All were nymphs, as this bird is not able to break up the adults with its slender bill; four were in one stomach and two in another. Nearly all the birds collected were taken near mangrove swamps and along beaches, and it is very probable that along inland streams, flowing through cultivated fields, spotted sandpipers would pick up many more changas than is here indicated.

One bird had eaten a tiger beetle, 13 adult water scavenger beetles (*Berosus* sp.), and 4 hydrophilid larvæ, amounting to 3.89 per cent of the total. Aquatic bugs made 4.11 per cent of the whole; seven broad-shouldered water striders (*Mesovelia* sp., and *Microvelia* sp.), two water boatmen (*Corixa* sp.), and three back swimmers (*Plea* sp. and *Notonecta* sp.) were found in one stomach. Crustaceans aggregated 80.12 per cent and were made up of small amphipods and fiddler crabs (*Uca pugnax rapax*). Another small crab (*Sesarma* (*Holometopus*) *roberti*) and an isopod (*Excirolana mayana*) also were identified. Ants in one stomach and bits of an earwig in another form miscellaneous matter amounting to 0.88 per cent.

From the foregoing the spotted sandpiper is a beneficial species and should not be molested. Only one item can be charged against it, a single tiger beetle, and that is too small to be of value. Fortunately the bird is common and, though only a migrant, is present for the greater part of the year. Thus it can be of great value in aiding in the war on the mole cricket.

UPLAND PLOVER. *Bartramia longicauda* (Bechstein).

GANGA.

The only known record for the upland plover is that of Stahl, who (Gundlach, 1881, p. 401) secured one some time between 1878 and 1881.

WILLET. *Catoptrophorus semipalmatus semipalmatus* (Gmelin).

CHORLO.

The willet was found by Stahl around San Juan Bay and by Gundlach (1878a, p. 188) at El Boqueron near Cabo Rojo. The latter writer says that these birds occurred on marshy shores and that he believed they nested on the island. Naturalists visiting the island more recently have failed to record them.

SOLITARY SANDPIPER. *Helodromas solitarius solitarius* (Wilson).

PUTILLA, SOLITARIO, ZARAPICO SOLITARIO.

The solitary sandpiper is a tolerably common winter visitant, apparently more abundant on the western half of the island. The first bird for the fall was an immature specimen taken along the Rio de la Plata above Comerio July 29, and by the last of August the species was common around Cabo Rojo. At Humacao a few birds were noted along the Rio Humacao the first week in September, but I saw none in the eastern part of the island in the spring. These sandpipers are found singly, scattered about pools of water left in the lowlands by the heavy rains, in wet, newly plowed fields, on mud flats, in the lagoons of the coastal region, or along streams. Tame and unsuspicious, they walk with a quick, tilting motion of the body, and when flushed fly rapidly, with a quick note—*pees wees.*

Sundevall (1869, p. 602) received a winter specimen in the collection of Hjalmarson; Gundlach (1878, p. 372) records them from the second half of September to April; and Bowdish (1902–3, p. 360) says that they are often seen in fall and winter.

Food.—Two stomachs taken in July and August contained nothing but animal matter. More than half the contents consisted of dragon-fly nymphs and a large part of the remainder of water-scavenger beetles (*Berosus* sp. and others) and their larvæ. One bird had eaten a water boatman (*Corixa* sp.). Though the predacious dragon flies taken by these two weigh strongly against them, it may be found on examining more material that the birds consume injurious insects enough to counterbalance this. The birds should not hastily be condemned, as there is no reason to suppose that their food differs greatly from that of the spotted sandpiper. It may also be found that, like that species, they consume numbers of the nymphs of the mole cricket.

LESSER YELLOW-LEGS. *Totanus flavipes* (Gmelin).

CHORLO, CABALLERO, PATIAMARILLO.

The lesser yellow-legs is recorded as a winter visitant from September to April (Gundlach, 1878, p. 371), but seems to be more common during fall migration. Dr. Richmond (MS.) noted the species on Vieques, March 25, 1900, and this is the only known recent spring record. Stahl (1887, p. 449) says that in 1886 the first were seen on August 9, somewhat earlier than in previous years.

I found them only near Cabo Rojo from August 24 to 31, when fall migration was apparently at its height. The birds fed along the overflowed borders of lagoons and also in moist newly plowed fields in the lowlands. Many were seen in flight following the trend of the coast southward.

Food.—Four stomachs examined, all taken at Cabo Rojo the last of August, contained nothing but animal matter. Water boatmen (*Corixa* sp.) found in each of the four make 57.5 per cent, and two stomachs contained nothing else. Crustacean remains, among which were several crabs (*Sesarma* (*Holometopus*) *roberti*), were identified in two stomachs, and make the remainder, 42.5 per cent. Apparently this species is neutral as regards agricultural interests.

GREATER YELLOW-LEGS. *Totanus melanoleucus* (Gmelin).

PLAYERO, CABALLERO CHILLON, ZARAPICO BLANQUINEGRO.

Apparently a migrant in spring and fall in Porto Rico, the greater yellow-legs may occasionally spend the winter there around some of the more inaccessible lagoons. Three were noted near Salinas May 2 and one was taken. A single individual was seen May 26 at the Laguna de Guanica, and on August 26 three or four were feeding on mud flats at Porto Real, near Cabo Rojo. The species is recorded by Sundevall (1869, p. 602) and Gundlach (1878, p. 370). Stahl (1887, p. 449) found them as early as August 9, 1886.

Food.—The stomach of the single bird taken was nearly full of finely ground fragments of small crustaceans. The only other items were the maxillæ of an aquatic larval insect. Nothing of economic importance was taken.

MARBLED GODWIT. *Limosa fedoa* (Linnæus).

CHORLO, BARGA.

Gundlach (1878, p. 368) records the marbled godwit from Boqueron below Cabo Rojo, where he found a single bird. There are no other certain records.

SANDERLING. *Calidris leucophæa* (Pallas).

ARENERO, PUTILLA.

The sanderling is apparently a rare migrant in Porto Rico. The first record is that of Gundlach (1878, p. 376), who notes a male taken at Bayamon by Stahl. The latter (1883, p. 151) says that he had two specimens in his collection and adds (1887, p. 450) that the species lingers late in spring. Nothing further has been found regarding its occurrence.

SEMIPALMATED SANDPIPER. *Ereunetes pusillus* (Linnæus).

PUTILLA, PUTILLITA DIMINUTA, ZARAPICO GRACIOSO.

The semipalmated sandpiper is a tolerably common winter visitant. From August 24 to 31 individuals were common in the coastal region at Cabo Rojo about the shallow lagoons. Several times they were seen singly or in small flocks feeding in newly plowed fields, where the soil was soft from the heavy rains, climbing over clods and furrows, or gathering about small pools of standing water. Bowdish took a specimen on Mona Island August 11, 1901, and Gundlach (1878, p. 374) records it as a winter visitant. Sundevall (1869, p. 602) notes four specimens received from Hjalmarson. Stahl (1887, p. 449) says that they arrived at the end of August, 1886, and (loc. cit., p. 452) that a few individuals remain throughout the summer.

Food.—Six stomachs taken at Cabo Rojo in August contained 99.16 per cent of animal matter and 0.84 per cent of vegetable matter. Beetles, bugs, fly pupæ, and small mollusks form the bulk of the food. Small water scavenger beetles (Hydrophilidæ) were found in four stomachs and amount to 27 per cent. Two ground beetles (*Bembidium* sp.) amount to 5 per cent, and miscellaneous beetles to 3.34 per cent. One bird had eaten nothing but four back swimmers (*Notonecta* sp.), and these made 16.66 per cent. Fly pupæ figure largely in two stomachs, forming 21.66 per cent of the total, and snails (*Planorbis* sp.) 13 per cent, while miscellaneous animal matter amounts to 12.50 per cent. The small quantity of vegetable matter present was rubbish. The numbers of Diptera eaten speak well for this sandpiper.

LEAST SANDPIPER. *Pisobia minutilla* (Vieillot).
PUTILLA, PUTILLA MENUDA, SARAPICO PEQUEÑO.

Gundlach (1878, p. 376) records the least sandpiper as a winter visitant. It is still common during migration. Stahl (1887, p. 449) says that the birds arrived from the north at the end of August in 1886, and that a few individuals remained through the summer. Bowdish (1902–3, p. 360) notes the first arrivals for Porto Rico September 23, 1900, and September 4, 1901. He also found them common on Mona Island August 9 to 21, 1901. I saw one at the Laguna de Guanica May 26, and August 28 one at Joyuda, near Cabo Rojo. Further observations may show that they are more common in other localities.

Food.—The stomach of the single bird taken contained the heads of more than 100 minute fly larvæ (75 per cent) and fragments of small beetles (*Heterocerus* sp.) (25 per cent).

WHITE-RUMPED SANDPIPER. *Pisobia fuscicollis* (Vieillot).
PUTILLA.

The white-rumped sandpiper is a rare migrant and possibly a winter visitant to Porto Rico. Bowdish (1902–3, p. 360) took one near Mayagüez October 2, 1900, the first record for the island. April 15 I saw two on the north shore of Culebrita Island. The species should occur on mud flats bordering lagoons and in similar localities.

PECTORAL SANDPIPER. *Pisobia maculata* (Vieillot).
PUTILLA, PUTILLA PINTA, SARAPICO MANCHADO.

Gundlach (1878, p. 375) records the pectoral sandpiper as a winter visitant from September to April, but it probably occurs more commonly during migration. Stahl (1887, p. 452) says that it lingers late in spring and that a few individuals are found through the summer. Bowdish (1902–3, p. 359) secured specimens September 26, 1900, and October 2 near Aguadilla. I saw a flock of about a dozen around a little tidal pool near Guayanilla August 24.

STILT SANDPIPER. *Micropalama himantopus* (Bonaparte).
PUTILLA, SARAPICO ZANCUDO.

On August 28 a pair of stilt sandpipers came driving swiftly down the coast at Joyuda, near Cabo Rojo, and one was taken. They are winter visitants, apparently rather rare, and are to be looked for on mud flats bordering lagoons and about shallow pools of water with muddy shores. Gundlach (1878, p. 373) says that they arrive in September. Sundevall (1869, p. 602) received three specimens from Hjalmarson. Stahl (1883, p. 151) had one specimen in his collection. The stomach of one bird, taken about 11 in the morning, contained gravel alone, which would indicate that this individual was a migrant and had come a long distance.

WILSON'S SNIPE. *Gallinago delicata* (Ord).
BECACINA.

According to Gundlach (1878, p. 368) Wilson's snipe is a winter visitant, occurring from September until spring. December 19, 1911, a dozen were seen about a pool in a low field near Rio Piedras and one was taken; another was flushed at the edge of a mangrove swamp December 22. The fact that these snipe occur on the island in the winter months is unknown to most sportsmen, but apparently they are to be found about fresh-water marshes and swamps in fair numbers during early winter.

Food.—The stomach of one bird contained bits of a water boatman (*Corixa* sp.), remains of two larval water scavenger beetles, and fragments of an ant, all of which amounted to 30 per cent of the bulk. Mole cricket remains (*Scapteriscus didactylus*), an interesting find in the stomach of this bird, amounted to 10 per cent. Vegetable matter (60 per cent) was composed mainly of bits of grass, wood, etc., while three seeds of guinea grass (*Panicum* sp.) and one of sedge (*Carex* sp.) were identified. Examination of a large number of stomachs of this snipe might show that it is an important enemy of the changa.

BLACK-NECKED STILT. *Himantopus mexicanus* (Müller).

VIUDA, PLAYANTE, YEGÜETE, ZANCUDO.

The black-necked stilt is a resident species formerly common everywhere in the lagoons. Gundlach (1878, p. 377) records it from Puerto Real, Cabo Rojo, Boqueron, and the Rio Arecibo. At present it is found commonly only in the extensive lagoons and swamps between Salinas and Guayama, at the Laguna de Guanica and around Boqueron, and only stragglers occur in other localities. In March, 1900, the birds were reported as occasional on Vieques (Richmond MS.). When feeding they wade among the plants in water almost to their bodies, swimming when beyond their depth, or else pick their way along the muddy shores of the lagoons, gleaning as they go. The breeding season extends apparently from the last of April to the first of June, and at that time the birds are very noisy. Long before the marshes are reached their notes may be heard, and as one approaches stilts come flying out rather slowly, the long legs stretched out behind, calling *kek kek kek* loudly. As they pass overhead they circle rapidly, but are easily killed and are too often a mark for the sportsman. That the male assists in incubation is evidenced by two prominent incubation patches, one on either side of the breast, found in birds secured in April and May.

Food.—Two stomachs of the stilt were examined and found to contain animal matter only. Water boatmen (*Corixa* sp.) were present in large numbers and form more than half the bulk. Small fish scales amount to 40 per cent, and the remainder consists of miscellaneous matter. Though many fish are eaten, the birds would be harmful only in the immediate vicinity of a fish hatchery.

LAUGHING GULL. *Larus atricilla* Linnæus.

GAVIOTA, PALOMITA, FORASTERA, GALLEGO, GAVIOTA BOBA.

The laughing gull is a species fairly common along the seacoast of Porto Rico, Vieques, and Culebra. Bowdish (MS.) found them common around Mona August 9 to 21, 1901. In San Juan Harbor only an occasional bird was seen during the winter months, but by July there were numbers. On Culebra they were common after April 15 in the harbor, and I heard and saw them frequently. Around Desecheo the middle of June there were about 30, though none seemed to be breeding. They were continually passing up and down the coast, calling and scolding whenever I was in sight. At times they came around my camp to investigate the refuse, but otherwise were rather wild. Their flight is strong and direct.

Food.—Fish remains comprised 70 per cent of the contents of two stomachs and in one was found a crab (*Plagusia depressa*). Gulls are always largely scavengers. Bowdish saw two feeding on the body of a booby which he had skinned and thrown into the water.

NODDY. *Anoüs stolidus stolidus* (Linnæus).
Gaviota, Cervera.

The noddy was an abundant species on Desecheo Island the middle of June and was not noted except in that vicinity. About 2,000 of them were already on the island, while many had not yet come in to nest. The birds were found on the rough limestone ledges in parties of from half a dozen to 500, and their nests, mere collections of small flat stones, a twig or two, and perhaps a feather, were in hollows in the rock. Four eggs collected showed incubation of about five days and one was fresh. The females were apparently doing most of the incubating, with the males standing guard, but the latter must have occupied the nests part of the time, as all showed bare incubation patches on the breast.

Bowdish (1902–3, p. 358) notes them as common on the coasts of the main island and abundant on Mona and Desecheo. The nesting dates apparently vary somewhat from year to year, as he found well-grown young June 24, 1900.

Food.—Three stomachs of the noddy taken on Desecheo were examined and one was found to be entirely empty. Another contained the horny beaked jaws of a squid, and the third one medium-sized and two small fish. Definite statements concerning the food of this bird can not be made from this small amount of material, but undoubtedly fish form a large part of it and various marine animals the rest.

BLACK TERN. *Hydrochelidon nigra surinamensis* (Gmelin).
Gaviota, Gaviota Negra.

The only authentic record of the black tern is that of Gundlach (1878a, p. 191), who saw a specimen in the collection of Blanco in San Juan. It must be considered of casual occurrence in this region.

BRIDLED TERN. *Sterna anætheta* Scopoli.
Gaviota.

The handsome bridled tern was common on the rough, eroded limestone rocks strewing the lower portions of the north and west coasts of Desecheo Island. Bowdish (1902–3, p. 357) found them common on Desecheo and Mona and also records them from the coast of the main island, but Gundlach did not find them. As nearly as could be estimated there were about 1,500 of them on Desecheo. June 15 was apparently the beginning of the breeding season, as, although two eggs taken were far along in incubation, many of the birds had not laid.

Food.—Of five stomachs examined one was entirely empty. Fish remains were present in all the other stomachs and amounted to 70 per cent. One species was identified as a filefish (*Alutera* sp.). Mollusks (25 per cent) were represented by a gastropod and a cephalopod (*Spirula australis*), the latter one of the few of that order bearing a shell that exist to-day. Miscellaneous matter (5 per cent) consisted of a moth and a small echinoderm. Fish and marine mollusks form the large bulk of the food, and under present conditions the birds are to be considered harmless, as the fish eaten are not of economic importance.

SOOTY TERN. *Sterna fuscata* Linnæus.
Gaviota, Gaviota Oscura.

Gundlach (1878, p. 414) found sooty terns common on the north coast of Porto Rico and in July noted them at Mayagüez, while Stahl (1887, p. 453) says that he once shot a pair on the south coast of the island in June. Bowdish (1902–3, p. 357) found them common August 9 to 21, 1901, on Mona, which is undoubtedly one of their breeding places. I saw one with some common terns in the bay at Joyuda, near Cabo Rojo, August 28, and another with a flock of laughing gulls near Rincon September 2. Two were seen at sea about 200 miles north of Porto Rico September 12.

LEAST TERN. *Sterna antillarum* (Lesson).
GAVIOTA, GAVIOTA ANTILLANA.

Gundlach (1878, p. 412) says that the least tern was found by Blanco near San Juan, and by Stahl at the mouth of the River Toa (Rio de la Plata); and Stahl (1887, p. 453) says that they come in September. The latest record for them is that of Bowdish, who (1902–3, p. 357) saw a pair off Cabo Rojo Lighthouse August 22, 1901.

ROSEATE TERN. *Sterna dougalli* Montagu.
GAVIOTA.

On June 16 a small flock of roseate terns was seen feeding over the water and then resting in a close flock on the surface, between Desecheo and Porto Rico. July 8 a few were noted along the curiously eroded limestone ledges forming the shore line north of Manati. They darted about over the bare rocks above the ocean, harshly calling *cack, cack*. One of them, a female in rather worn plumage, was taken, and from their actions they were breeding, though no nests were found. At Joyuda near Cabo Rojo on August 28 five or six were feeding with a flock of common terns and resting with them on rocks in the water. Gundlach (1874, p. 314) doubtfully records the roseate tern as seen in Blanco's collection, and Cory (1892, p. 82) lists it from Porto Rico without comment. If *Sterna d. gracilis* Gould is retained as a valid subspecies, then both varieties are represented in the collection from Porto Rico, as the bill of a fall bird taken at Joyuda is entirely black, while in the case of a female taken near Manati on July 8 the base of the bill is slightly reddish. It is felt, however, that more material is needed to settle this question definitely.

The two stomachs examined contained only fish remains. No other data concerning their food are available.

ARCTIC TERN. *Sterna paradisæa* Brünnich.
GAVIOTA, GAVIOTA DEL PARAISO.

Gundlach (1878a, p. 163) saw the Arctic tern in the collection of Blanco, taken near San Juan. According to Stahl (1883, p. 154), who had three specimens in his collection, they arrive in September (1887, p. 453). There are no other specimens on record.

COMMON TERN. *Sterna hirundo* Linnæus.
GAVIOTA, PALOMITA.

The last of August the common tern was fairly numerous along the coast at Porto Ferro and Joyuda near Cabo Rojo. This is apparently the first record for Porto Rico, though the winter range of the bird is given as from Florida to Brazil.[1] On August 28 these terns were following a school of mackerel that was driving up and down the shallow water behind the reefs at Joyuda. The birds dived down excitedly when the minnows were driven up, and when satisfied gathered in a close flock on rocks standing in the water. Two were collected.

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[1] A. O. U. Check List North Amer. Birds, 3d ed., 1910, p. 44.

Food.—The two stomachs examined contained well-digested remains of minnows. One bird had eaten 12 or more and the other 6. These fish are not of economic importance.

CABOT'S TERN. *Sterna sandvicensis acuflavida* Cabot.
GAVIOTA, GAVIOTA DE PICO AGUDO.

Gundlach (1878, p. 411) found Cabot's tern common along the coast of Porto Rico, and secured a specimen at Mayagüez (1878a, p. 191). Stahl (1883, p. 154) had two specimens in his collection and remarks (1887, p. 453) that it is found throughout the year. It has not recently been seen here by naturalists.

ROYAL TERN. *Sterna maxima* Boddaert.
GAVIOTA, GAVIOTA REGIA, CHIRRE.

Tolerably common along the coasts of Porto Rico, Vieques, and Culebra, the royal tern is frequently seen in San Juan Harbor, usually alone but sometimes in company with laughing gulls. At Mameyes in February there were a few about Punta Picua, where they perch on posts standing in the water, always facing the wind. Occasionally one would swoop down and capture a minnow or circle around with harsh cries, but always returned to the same perch. Their occurrence here was not regular and the birds were evidently wanderers.

Food.—The three stomachs examined contained only fish, which without doubt form the greater part of their food. One parrot fish (*Sparisoma* sp.) was recognized, but the others were too well digested for identification. From observation the royal tern seems to be almost entirely piscivorous. Examination of more stomachs will doubtless corroborate this.

RUDDY QUAIL-DOVE. *Geotrygon montana* (Linnæus).
PERDIZ, PERDIZ DE MONTE, BOYERO.

The ruddy quail-dove is a rather rare resident species except in a few localities where protected by dense cover or in regions high in the mountains. Sometimes they are found in coffee plantations, but usually occur in areas of second growth on steep hillsides. The birds walk rapidly away before an intruder, with nodding heads, or else crouch down and hide, and in the dim light it is difficult to make them out. When frightened they fly with a loud fluttering, and after a few feet set the wings to sail off noiselessly. The mongoose, the greatest enemy of this bird, is abundant in the lowlands, but has not yet penetrated far into the interior. Apparently it has exterminated the quail-doves in the coastal region, as none were seen save near Manati.

The breeding season appears to begin the first of March, and the quail-doves seem to have but one brood a season. The natives say that they nest on the ground. Males during this period have a low resonant note, coming apparently from a distance, but finally resolving itself into a deep *coo-oo-oo,* with a peculiar undertone, as of the humming of the wind across the end of a gun barrel, a very striking sound, and one difficult to locate.

Food.—Five stomachs of the ruddy quail-dove were examined and found to contain vegetable matter alone, save that one bird had eaten an ant, taken probably by accident. During the orange season the birds feed largely on seeds of sweet oranges (chinas), and these were found in four stomachs. One bird had taken 17 seeds and another 13, while others contained smaller quantities. Field observation showed that these seeds were taken from decayed fruit lying under the trees. The fallen oranges were pecked open when they became soft from lying on the moist earth, the birds going straight to the centers and picking out the seeds, so that rotting oranges with neat round holes in them were common in the haunts of the perdiz. The soft bill of this dove would preclude attacks on sound oranges. Hard ivorylike grass seeds (*Olyra latifolia*) were in two stomachs and pits of the moral (*Cordia* sp.) in two. One bird had eaten seeds of a spurge (*Chamæsyce* sp.), and other undetermined seeds belonging to the madder, myrtle, and spurge families were found. Leaves occurred in four stomachs and in one made a large part of the bulk.

Near Manati the birds fed on the fallen fruit of the manchineel (*Hippomane manchinella*), which to human beings is very poisonous. This was the only locality in which the birds were observed in trees.

The quail-dove may be considered a game bird, and should be given the same open season as the larger pigeons. In its food habits it is harmless and does a certain amount of good by eating harmful seeds.

KEY WEST QUAIL-DOVE. *Geotrygon chrysia* Salvadori.
PERDIZ MARTINIQUEÑA, BARBEQUEJO.

Taylor (1864, p. 171) says that the Key West quail-dove is not uncommon in Porto Rico, and Gundlach (1878, p. 347) records a specimen in the collection of Blanco and a drawing in the album of Bello. Stahl (1883, p. 148) had a male in his collection taken on the island. Bowdish (MS.) says that they were found on Mona from August 9 to 21, 1901, but he did not preserve specimens. A perdiz, possibly of this species, was described to me near Palo Seco, but I did not meet with it.

TEMMINCK'S QUAIL-DOVE. *Geotrygon mystacea* (Temminck and Knip).
PERDIZ.

A specimen in the National Museum, collected on Culebra Island February 9, 1899, by A. B. Baker, of the Fish Commission, is the only record of Temminck's quail-dove for this region (Riley, 1903, p. 14). None were found during my stay on Culebra, and it may be that the bird no longer occurs there. It has been previously recorded in St. Croix.

PORTO RICAN GROUND DOVE. *Chæmepelia passerina trochila* Bonaparte.
ROLA, ROLITA, TORTOLITA.

The ground dove is a common resident species on all the islands visited, except Desecheo, being most abundant on Culebra. In Porto Rico it is rarely found above 500 feet altitude, but in following inland along the courses of streams it occasionally ranges up to 1,200 feet, as at Cayey and Lares. The birds occur on stony hillsides, in plowed fields, brush-covered pastures, and open country in general. They walk about quickly, with long steps and rapidly nodding heads, picking up seeds, bits of gravel, etc., as they go. Before an intruder they walk rapidly away, raising the tail nervously, or after crouching to the ground rise with a sudden flutter of wings and dart swiftly away, exposing the red undersurface of the remiges. The birds are found in pairs, or occasionally, before or after the breeding season, in small flocks. After flying a short distance they drop to the ground or perch in rather open trees, sitting close together. When alarmed they sidle quickly along the limbs, hiding behind them, or suddenly take flight. The males utter a loud note, *coo-coo-coo-coo*, when perched in the trees, and during summer these calls are answered from every side. The males also have a habit of sailing out in short circles, with wings stiffly spread, giving them an odd kitelike appearance.

The breeding season probably extends from the first of March to the last of August, though on Culebra the birds remained in flocks until the 10th of April before pairing. Nests on Vieques were large, deeply cup shaped, and contained much material, while Porto Rican nests were slight and flimsy, so that in many cases the eggs could be seen from beneath. Two eggs, white in color, form a set, and at least two broods are reared in a season. While the females were incubating the males fed together, often in the yautia or cane fields. When caring for their young the females feed in the early morning, filling the crop with seeds, and then about 9 o'clock fly in to water, usually following well-defined routes. After drinking they perch quietly in the trees, and in about 30 minutes the "pigeons milk" forms as a thick curd, beginning in the lower portion of the crop. After June flocks of a dozen or more young gathered by themselves were common. They are said to have nested formerly on the ground, but now they build almost entirely in trees to escape the mongoose.

This species is one of the few found in cane fields, and it occurs regularly, even when the cane is well grown. These doves are very timid and show great fear of sparrow hawks, sometimes refusing to fly when they are in the neighborhood. During the breeding season the males were found in early morning feeding in the cane fields or else cooing from the hills, while the females were above on the hillsides. When there was a heavy dew the birds were inactive until 10 or 11 o'clock.

Food.—Seventy-two stomachs of the ground dove were examined and the food was found to be almost entirely vegetable. Animal matter, though present in 10 stomachs, amounted to only 0.25 per cent and may be considered accidental. Fragments of ants occurred in eight, while in the other two were spherical shining scale insects known as ground pearls (*Margarodes formicarum*). These are sometimes found loose in the soil, and from their appearance might be picked up as gravel to aid digestion.

The belief common in some localities that these doves consume many insects is not borne out by stomach examination. Like others of the pigeon family having similar habits, ground doves are almost entirely granivorous. As an instance of the unreliability of unverified field observations, I saw a bird on Vieques Island March 30 hopping rapidly about in the small terminal twigs of a muñeco tree, apparently in pursuit of insects. After watching it for a minute I collected it, and found to my surprise that it was a ground dove, and, on examining the stomach and crop in the laboratory, found seeds only and not a trace of animal matter.

Practically all the food, or, to be exact, 99.75 per cent of it, is composed of seeds. These are picked up usually in cultivated fields, the borders of roadways, trails, and other open localities. Weed seeds, as the term is commonly applied, form about one-fourth of this mass, though undoubtedly many classed here as miscellaneous should come under this head. Purslane, lamb's-quarters, various other seeds of the goosefoot family, amaranth, caltrop, spurges, and mallows are most commonly eaten, all of them noxious to the agriculturist. Grass and sedge seeds form another great class, amounting to about one-third of the whole. Crab grass and wire grass were taken frequently, and several species of panic grass and sedges form the bulk of the remainder.

Wild fruits, figs, and species of *Rubus* amount to only 3.4 per cent, while no grain or cultivated vegetable was found. The remainder consists of a mass of miscellaneous seeds, euphorbias, wild legumes, and seeds of various shrubs abounding in the localities frequented by this dove. As many as 16 varieties were identified in a single bird, counting the contents of crop and gizzard, and sometimes there were large numbers of a single species. One bird had eaten 9,600 seeds of purslane and another more than 5,000. In one stomach 2,400 Egyptian grass seeds were found and in another 1,450 of the amaranth. Other species were present in considerable numbers in each case.

Absolutely no harm is done to man or his interests by the ground dove, but, on the contrary, a certain amount of good is accomplished in the destruction of pernicious weeds. Although many ground doves are killed by sportsmen, the species is too small to be considered a game bird, and because of its beneficial habits it should be protected throughout the year.

Following is a list of seeds identified in the stomachs of the ground dove, together with the number of stomachs in which found:

Many-seeded paspalum (*Paspalum millegrama*)	1
Other paspalums (*Paspalum* sp.)	7
Crab grass (*Syntherisma sanguinalis*)	8
Panic grass (*Panicum fasciculatum*)	29
Panic grass (*Panicum utowanæum*)	1
Other millets (*Panicum* sp.)	29
Broad-leaved olyra (*Olyra latifolia*)	1
Rush grass (*Sporobolus indicus*)	1
Wire grass (*Eleusine indica*)	30
Egyptian grass (*Dactyloctenium ægypticum*	12
Ichnanthus (*Ichnanthus pallens*)	1
Fimbristylis (*Fimbristylis* sp.)	2
Whitetop (*Dichromena ciliata*)	3
Nut rush (*Scleria* sp.)	3
Sedge (*Carex* sp.)	12
Sanguinaria (*Tradescantia* sp.)	3
Star grass (*Hypoxis* sp.)	7
Wild fig (*Ficus crassinervia*)	2
Wild fig (*Ficus* sp.)	1
Knotweed (*Polygonum* sp.)	3
Goosefoot (Chenopodaceæ sp.)	19
Cenizo (*Chenopodium album*)	2
Pigweed (*Amaranthus gracilis*)	1

Carpet weed (*Mollugo verticillata*)	1
Verdolaguilla (*Talinum paniculatum*)	1
Verdolaga (*Portulaca oleracea*)	37
Fresa (*Rubus* sp.)	1
Vetch (*Vicia* sp.)	18
Wild bean (*Phaseolus lathyroides*)	2
Vinagrillo (*Oxalis* sp.)	3
Caltrop (*Kallstrœmia maxima*)	19
Euphorbia (Euphorbiaceæ sp.)	14
Spurge (*Chamæsyce* sp.)	7
Jatropha (*Jatropha* sp.)	3
Croton (*Croton* sp.)	5
Malvaceæ sp.	27
Escoba (*Sida* sp.)	28
Bretonica prieta (*Melochia nodiflora*)	2
Flacourtaceæ sp.	6
Nightshade (*Solanum* sp.)	1
Nigua (*Tournefortia* sp.)	1
Llanten (*Plantago* sp.)	1
Rubiaceæ sp.	6
Gherkin (*Cucumis* sp.)	3
Concombre (*Cucumis anguria*)	1
Dog fennel (*Anthemis* sp.)	2
Compositæ sp.	9

MONA GROUND DOVE. *Chæmepelia passerina exigua* Riley.
ROLITA, ROLA.

The subspecies of the ground dove found on the island of Mona (the type locality) is reported by Bowdish, the original collector, as abundant there from August 9 to 21, 1901. It has without doubt the same habits as the mainland subspecies, but differs from it in being smaller and paler. No ground dove was found on Desecheo Island.

PORTO RICAN DOVE. *Zenaida zenaida lucida* Noble.[1]
TORTOLA, SANJUANERA.

The Porto Rican dove is common all through the region covered by this report. On Porto Rico it is largely a bird of the cultivated valleys and lowlands, roosting in clumps of trees, coffee plantations, or small areas of second growth and flying down to feed morning and evening in the fields and citrus groves. Its flight is strong and direct, and it flushes with a loud clapping of wings. On the ground it resembles the mourning dove, as it walks quickly about with nodding head, and has a cooing note almost indistinguishable from that of the latter bird.

During the breeding season the males frequently sail out in circles, with wings held stiffly, and their cooing notes come from the hillsides all day long. Several times, while mating, males were seen walking rapidly about on the ground near the females, striking at each other with their wings. Breeding birds were taken in February and a young bird, not quite adult but able to fly, was collected near Manati July 8. Although in some localities the birds nest on the ground, here they must nest in the trees, or they would not be able to hold their own against the mongoose.

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[1] Proc. New Engl. Zool. Club, V, Oct. 4, 1915, p. 101.

Between 9 and 10 in the morning the birds come to the streams and ponds for water, usually in pairs, flying swiftly, high in the air. On the gravel bars of the larger rivers they walk about quickly, quenching their thirst, and picking up bits of sand and gravel. Usually they are wary, but sometimes prefer to hide at the approach of an intruder rather than fly.

Food.—As in the case of the ground dove, this zenaida dove may be considered entirely vegetarian in its diet. In 22 stomachs examined, animal matter was found only four times. Two birds had eaten bits of the chrysalis of a lepidopteran, one had found fragments of a bettle, and another had taken a snail (*Truncatella* sp.), perhaps along with gravel. These combined amount to only 0.36 per cent, indicating that this dove practically confines itself to vegetarian fare. Seeds comprise its principal diet, only small quantities of other vegetable matter, perhaps leaves, being found. Grass and sedge seeds figure to a less extent than in the food of the ground dove, while there is a corresponding increase in wild legumes, larger euphorbias, mallows, and others. Seeds of knotweed, goosefoot, pigweed, and purslane were eaten, as well as large quantities of caltrop and mallows.

One bird had secured grains of hedionda (*Cassia occidentalis*), which is used as a substitute for coffee, and another had eaten seeds of a citrus fruit, perhaps of an orange. The latter, however, were almost certainly taken from the ground, not from the fruit itself, as this dove is incapable of tearing open undecayed fruit. Three birds taken near Comerio had eaten rice, of the inferior red variety, which may well have been picked up as waste. None of the others examined had eaten grain, a strange fact when the habits of the bird are considered. The birds were observed in the field eating fruit of the moral (*Cordia* sp.), and pits of this fruit were found in two stomachs. On Vieques Island they were said to eat other fruits, as do the larger pigeons, but no trace of such was found. The little damage that they do in eating grain is more than offset by the injurious seeds destroyed. Thus the bird may be considered of some value to the landholder, in addition to being a game bird of importance. As this species frequents the open country, it is well able to adjust itself to changing conditions and with proper regulations will remain a common game bird. The same restrictions should be placed on its pursuit as on that of the other large pigeons.

The following seeds and fruits were eaten by the zenaida dove:

Paspalum (*Paspalum* sp.)	1
Panic grass (*Panicum* sp.)	4
Broad-leaved olyra (*Olyra latifolia*)	1
Arroz (*Oryza sativa*)	3
Nut rush (*Scleria* sp.)	9
Knotweed (*Polygonum* sp.)	1
Goosefoot (Chenopodaceæ sp.)	2
Pigweed (*Amaranthus* sp.)	1
Verdolaga (*Portulaca oleracea*)	1
Cardosanto (*Argemone* sp.)	3
Senna (*Cassia* sp.)	2
Hedionda (*Cassia occidentalis*)	1
Fabaceæ sp	11
Vetch (*Vicia* sp.)	1
Wild bean (*Phaseolus lathyroides*)	3
Yerba rosario (*Æschynomene* sp.)	2
Caltrop (*Kallstrœmia maxima*)	2
Orange (?) (*Citrus* sp.)	1
Espino (*Xanthoxylum* sp.)	1
Euphorbiaceæ sp	9
Jatropha (*Jatropha* sp.)	3
Malvaceæ sp	4
Escoba (*Sida* sp.)	1
Cadillo (*Urena lobata*)	2
Passifloraceæ sp	1
Adelia (*Adelia* sp.)	1
Morning glory (Convolvulaceæ sp.)	1
Nightshade (*Solanum* sp.)	1
Yerba mora (*Solanum nigrum*)	1
Moral (*Cordia* sp.)	2
Trumpet flower (*Tecoma* sp.)	1
Llanten (*Plantago* sp.)	1
Compositæ sp	1

[MOURNING DOVE. *Zenaidura macroura macroura* (Linnæus).
TORTOLA.

The mourning dove has been variously attributed to Porto Rico, but has not been unquestionably recorded. Ledru (1810, p. 208) has the earliest record and is followed by

Hartlaub (1847), who is quoted by Sundevall (1869, p. 601). Mr. Bowdish tells me that in some way he confused this bird with *Zenaida zenaida lucida,* as the notes and actions of the two are similar, so that his record (1902–3, p. 361) is not available. I watched carefully for this species on the island and made many inquiries concerning it without success.]

WHITE-CROWNED PIGEON. *Columba leucocephala* Linnæus.
Paloma Cabeziblanca, Viequera, Torcaza.

The white-crowned pigeon was formerly one of the most abundant species in Porto Rico, but now is found only in a few localities. Gundlach (1878, p. 345) spoke of it as very common in the seventies, but its numbers have undoubtedly greatly decreased. The birds occur mainly near the coast, usually in dense swampy growths, though one was seen near Aibonito; and the few small areas of forest remaining in the lowlands may account for their diminution in numbers. Around Punta Picua, north of Mameyes, they were found preparing to breed in the swamps, where the growth was so dense that it was hard to get near them. They usually came out into the more open portions late in the evening, to feed on the fruit of the icaco (*Chrysobalanus* sp.), but even then kept well concealed in the thick leaves. The birds flushed with a loud clapping of wings, and flew strongly, making wide sweeping circles, or darting swiftly through the trees. In the heat of the day they perched in high trees over the swamps, resting quietly on dead limbs.

The first of July they were fairly common in the dense brush near the lagoons to the north of Manati. In May and June, when various fruits are ripe, they gather in considerable flocks and visit regions where they are unknown at other times.

Food.—Five stomachs examined contained vegetable matter only, composed of drupes and fruits of fair size. The icaco and berries of various palms (palmo real and lluma) are favorites with these birds, while a tree known as palo blanco (*Drypetes* sp.) is said to furnish them food in season. No cultivated crop is injured, the bird depending wholly upon wild fruits for its sustenance. With the clearing of the remaining forest areas in the lowlands this species will, without doubt, become practically extinct. At present, however, it has a certain importance as a game bird, and for its protection the same measures apply as for the scaled pigeon (p. 54).

The following were identified in the stomachs examined:

Palmo (*Coccothrinax* sp.)	1	Fabaceæ sp.	1
Icaco (*Chrysobalanus* sp.)	2	Adelia (*Adelia* sp.)	1
Icaco (*Chrysobalanus pellocarpus*)	1	Moral (*Cordia* sp.)	1

SCALED PIGEON. *Columba squamosa* Bonnaterre.
Paloma Turca.

The large scaled pigeon is resident in Porto Rico in the mountain regions, and is common in the higher inaccessible portions where areas of forest still remain. A few were seen on Vieques and Culebra, where formerly they were said to be common. From all accounts they are abundant on Mona, and occur on Desecheo also, at times in considerable numbers. In the dense forests covering the slopes of El Yunque de Luquillo, in the northeastern part of Porto Rico, great numbers were noted. In the late afternoon and evening it was common to see them circling high in the air near the Hacienda Catalina, while in the forests they abounded up to 2,500 feet altitude. It was surprising how well 25 or 30 of these big pigeons roosting in the thin foliage of a cacao rosetta tree (*Sloanea berteriana*) managed to keep hidden. The ordinary call note was a loud, strongly accented *who hoo hoo,* while a burring guttural *hoo-o-o-o,* given with a throaty rattle, was almost startling when directly overhead. Many pigeons fed in the tall trees fringing small streams at the foot of the mountain, while some were found in the dense swampy forests near Punta Picua, beyond Mameyes.

It is commonly believed in Porto Rico that the scaled pigeon is found there only as a migrant. This belief, fostered mainly by gunners who desire an open season covering the entire year, is erroneous, as was proven on March 8, when on El Yunque three nests were found without special search, while there was no doubt whatever that the dozens of birds flushing on every hand were breeding birds. The three nests located were about 15 feet from the ground on horizontal limbs, or on refuse piled on large air plants, and were made of sticks loosely piled together. Two were empty, while one contained a single white egg of about five days' incubation. At Maricao on June 1 a native brought in a young bird about two-thirds grown, and said it was the only one in the nest. Gundlach (1878, p. 344) says that the birds lay two eggs, but from these instances it would seem that a single egg in a set is not unusual.

Scaled pigeons are said to occur in fall in large flocks and to gather in great numbers where certain fruits are ripening, and at that time many are killed. There is, however, apparently some migration between the various Antillean islands, as the number of birds on Desecheo Island, for example, is said to vary greatly from one season to another.

Food.—Wild berries and fruits with an occasional succulent leaf or other bit of herbage make up the entire fare of this pigeon. Ten stomachs reveal vegetable matter only. The berries of various palms are favorite foods and wild figs when in fruit draw large numbers of birds. The moral (*Cordia* sp.) and jagua (*Genipa americana*) are eaten extensively and one bird had taken quantities of a wild legume. All of the smaller wild fruits in season appear to furnish food, and these are so abundant that cultivated fields are not molested. The fruits eaten, though sometimes of comparatively large size and with hard stony pits, are swallowed entire. The strong muscular gizzard of the bird has a tremendous triturating power, however, and the fruits are easily crushed and the meaty centers opened to the processes of digestion.

The paloma turca is the one game bird of importance in the inland region, because of its large size and universal distribution. Hunting it may be considered true sport, as the birds are wary, strong of wing, and can be pursued successfully only in the wildest, roughest country. It should be encouraged by every means possible, most of all by a close season extending from February 1 to October 15, to allow ample time for rearing the young. In addition there should be a bag limit of not more than 10 birds for one day.

The following were identified in the stomachs examined:

Palma de Sierra (*Acrista monticola*)	1
Palmo (*Coccothrinax* sp.)	1
Wild fig (*Ficus crassinervia*)	2
Wild fig (*Ficus lævigata*)	1
Fabaceæ sp	1
Guaraguou (*Trichilia* sp.)	1
Lauraceæ sp	1
Storax (*Styrax portoricensis*)	1
Nightshade (*Solanum* sp.)	1
Moral (*Cordia* sp.)	1
Jagua (*Genipa americana*)	1

[**RING-TAIL PIGEON.** *Chlorœnas caribæa* (Jacquin).

PALOMA.

Ledru (1810, p. 208) speaks of the ring-tail pigeon and Wagler[1] includes Porto Rico in its range. Gosse[2] says that Maugé, the zoologist who accompanied Ledru, found the species in flocks of many hundreds. It may have occurred formerly in Porto Rico, but no specimens are known at present, and as the old records are rather doubtful the species must be considered hypothetical.]

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[1] Systema Avium 1827, p. 46.

[2] Birds of Jamaica, 1847, p. 296.

BLUE PIGEON. *Chlorœnas inornata exsul* Ridgway.[1]
PALOMA SABANERA.

The blue pigeon is now rare in Porto Rico. Gundlach (1878, p. 343) found a few near Lares in July and Stahl (1883, p. 148) had a female in his collection. They were reported to the writer several times and seemed to be found in the coastal region, though no definite localities were known. As the name was familiar to sportsmen, the birds doubtless have been shot in recent years. This species should be included with the paloma turca in any restrictions upon hunting (see p. 54).

SANTO DOMINGO PAROQUET. *Conurus chloropterus* (Souancé).
PERIQUITO.

Cory (1892a, p. 228) referred a paroquet taken on Mona Island by W. W. Brown, jr., to the species *Conurus chloropterus*, and permitted the writer to examine this bird and a small series from Santo Domingo. The specimen from Mona unquestionably belongs to this species, though with further study it may be differentiated as a subspecies from the Santo Domingan bird. Gundlach (1878, p. 229) received three wings from Mona Island taken by Block, and these were later described as *C. gundlachi* by Cabanis. Bowdish found no paroquets on Mona, and the writer made careful inquiries when on the west coast among the fishermen who visited Mona regularly, but could learn nothing regarding them. One man claimed to have lived there a year without seeing them, though he was able to describe the other birds of the island accurately.

There is reason to believe that at one time there existed a species of paroquet in Porto Rico, but it has long been exterminated. According to the British Museum Catalogue of Birds, it is represented by the type in the Paris Museum and by an additional specimen at Leyden. Gundlach was told of a paroquet formerly common in the eastern interior of Porto Rico and on Vieques Island, but long since extinct. Stahl (1887, p. 448) says that some of the oldest inhabitants had heard from their parents of this bird, but that it had disappeared long ago. Bowdish (1902–3, p. 20) heard of its occurrence near Lares, but I could find no one who knew anything about it. There were numerous paroquets in captivity in Porto Rico, but they were either *C. wagleri*, from Venezuela, or more rarely *C. chloropterus*, imported from Santo Domingo.

PORTO RICAN PARROT. *Amazona vittata* Boddaert.
COTORRA.

Fifteen years ago the parrot was a common species in Porto Rico and on Culebra,[2] but now has disappeared except in a few localities, mainly in the northeastern portion of the island, on El Yunque and immediately around its base. Twenty or more ranged through the dense, swampy forests north of Mameyes, perhaps 50 were seen around the west fork of the Rio Mameyes, a number were heard calling in the dense forests covering the summit of El Yunque itself, and they are said still to be fairly common around Preston's ranch above Naguabo. They have practically disappeared farther west, though reported from below San Sebastian, and Mr. Leopold B. Strube, of the Hacienda Jobo, between Arecibo and Utuado, said that during winter 50 or 60 were found on his plantation, though none nested there.

Near Mameyes parrots remained in the swamps during the day, coming out to the borders morning and evening to feed, but when alarmed flew back immediately. Sometimes a small flock fed in company with white-crowned pigeons in the tops of the trees, but from their green coloration the parrots were the less conspicuous. Frequently they remained quiet in the trees for half an hour or more and then flew out in sudden alarm.

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[1] Proc. Biol. Soc. Washington, XXVIII, May 27, 1915, pp. 106–107.

[2] Mr. Ridgway has separated the bird from Culebra as *Amazona v. gracilipes*. (Proc. Biol. Soc. Washington, XXVIII, May 27, 1915, p. 106.)

Around El Yunque the parrots were somewhat tamer, as they were not hunted so much, and a few were secured about a large clearing above the Rio Mameyes. The birds were in pairs or small bands during March and were then breeding. During early morning and evening they fed in the forest, but in passing back and forth stopped in the high dead trees of the clearing. They also came here to dry their feathers after the heavy rains that came at intervals during the day. When it rained heavily on the mountain many birds descended to the warmer valleys, returning when the weather cleared. The call note, given on the wing when alarmed, was a rapid, strident *kār, kār* that could easily be heard a mile away, and served to alarm the entire forest. When feeding, low chuckling notes were frequently heard. In the trees the birds watched intruders suspiciously or went through the characteristic posturings of *Amazona* in captivity, swinging head down and then climbing back by the aid of their bills.

These birds nest during March and April, and are said to lay two eggs, depositing them in a hollow tree. They are greatly sought after by the natives, who keep the young as pets and teach them to speak a few words of Spanish. Most of the captive birds on the island, however, are brought from Santo Domingo. The adults also are hunted as game birds, and prized for their flesh. Formerly when there were large forest areas on the island the birds were very common and, traveling in large bands, damaged cornfields, gonduros, etc. Men engaged in school work said that, as late as 1903, children were frequently kept at home to drive the parrots out of the fields. The handful remaining is now too small to do any great damage, and the birds should be protected, or one of the most interesting forms will soon be lost from the avifauna of the island.

Food.—The parrot seems to be almost entirely frugivorous, all of the wild fruits being eaten in season. It is very fond of the wild fig (*Ficus* sp.) and the jagua (*Genipa americana*), while in the swamps near Mameyes the ground beneath icaco trees (*Chrysobalanus* sp.) was strewn with husks which the birds had dropped. In eight stomachs examined, vegetable matter only was found, seeds of tabonuco (*Dacryodes excelsa*) and allied species in the same family (Burseraceae) greatly predominating. A bird taken near Mameyes had eaten icacos (*Chrysobalanus* sp.) and its stomach contained also a few bits of wood. In the birds secured on El Yunque the stomachs were usually filled with small seeds while the crops were distended with larger fruits and drupes. The hard seeds in the gizzard seem to take the place of gravel used by many birds as a triturating element, and while they serve to grind up larger fragments are in their turn pulverized and utilized as food. Wherever parrots were common the ground was always littered with seeds, bits of pericarp, and other waste matter which they had discarded.

[**BLACK-BILLED CUCKOO.** *Coccyzus erythropthalmus* (Wilson).
PAJARO BOBO.

The black-billed cuckoo is of doubtful occurrence in Porto Rico. Gundlach included it on the strength of a drawing in the album of Bello, who received the bird from the interior of the island.]

YELLOW-BILLED CUCKOO. *Coccyzus americanus* (Linnæus).
PAJARO BOBO, PAJARO BOBO DE COSTA.

On August 27 a cuckoo heard calling in an almendra grove at Joyuda near Cabo Rojo was secured as it sat in the sun on a low limb; it proved to be the yellow-billed species. It was immature, and if not native must have been on the island for several days, as it was molting badly, having but two tail feathers. Another, thought to be this species, was heard August 31 near the same locality, but could not be found. Gundlach (1878, p. 232) records the species near Mayagüez, Aguadilla, and Arecibo. Bowdish (1902–3, p. 364) secured two near Aguadilla, May 18 and 20, 1900, and one on Mona, August 17, 1901. Thus the birds seem to be possible residents or regular migrants here in small numbers. They have the habits of the mangrove cuckoo, and thus far have been recorded only from the western end of the island, with the single exception of Gundlach's Arecibo record.

Food.—The only bird examined had eaten 15 caterpillars of two species and 3 sugar-cane root-boring weevils (*Diaprepes spengleri*). It is to be hoped that a bird capable of doing so much good may become more common over the entire island.

MANGROVE CUCKOO. *Coccyzus minor nesiotes* Cabanis.
PAJARO BOBO, PAJARO BOBO MENOR.

The mangrove cuckoo is a tolerably common resident species in this region. Many were found in mangrove swamps, coffee plantations, and in dense thickets overgrown with vines along small streams; but being of retiring habits, they were easily overlooked. In dry brush-covered areas, as on the smaller islands, they were especially common. The call notes are loud and sonorous and closely resemble those of the yellow-billed species. In the morning the birds frequently were seen sitting quietly in the sun on dead limbs, sometimes calling from these perches. Slow and methodical in their movements, they frequently remain motionless for several minutes and seldom fly far. On March 25, birds on Vieques Island were about to breed. The breeding season is of irregular extent, but appears to continue until October.

Food.—Fifteen stomachs were available for laboratory examination, and in these animal matter amounted to 99 per cent, Orthoptera and Lepidoptera (nearly all caterpillars) forming the main bulk of it. The vegetable matter (1 per cent) consist of a small quantity of rubbish found in one stomach secured in February. The true grasshoppers (Locustidæ) form 50.31 per cent of the food and occurred in 13 of the 15 stomachs examined. The eggs as well as the insect itself are eaten, one stomach containing 32 of them. A cuckoo taken on Culebra Island in April had eaten a single mole cricket, but this forms only 0.21 per cent of the total food. Walking sticks in four stomachs and a small cricket (*Ellipes minuta*) in one make 3.1 per cent, and one bird had eaten a praying mantis. Earwigs were taken by three birds. Cicadas (*Proarno hilaris*) in two stomachs and stink bugs in another form 6.09 per cent. Caterpillars occurred in nine stomachs and a moth in one, and together they amount to 29.52 per cent. Not much can be said regarding these, as the island species are not sufficiently well known, but undoubtedly they are all injurious. It is gratifying to learn that this cuckoo is as active in their destruction as are its better-known northern congeners, the yellow- and black-billed cuckoos of the United States. As is frequently the case with the northern species, several stomachs were lined with caterpillars' spines stuck in the walls of the stomach. Various beetles, almost all destructive weevils, form 3.59 per cent of the food. Scarred-snout beetles and a small curculionid (*Rhyssematus* sp.) were among the most important beetles taken. Spiders form 4.06 per cent of the total, and miscellaneous matter, fragments of a hymenopteran, a snail, and remains of earwigs figure as 1.83 per cent.

The mangrove cuckoo, with its appetite for Orthoptera and injurious caterpillars, is one of the most beneficial birds of the island. It has been accused without corroboration of eating other bird's eggs, but at present no evil is known of it. It will be noted that this is one of the few insectivorous birds of any size on the island that do not prey more or less upon the abundant lizards.

The following were identified in the stomachs of the mangrove cuckoo:

ORTHOPTERA.	
Ellipes minuta	1
Orocharis terebrans	2
Scapteriscus didactylus	1
Microcentrum triangulatum	2
Neoconocephalus sp	2
Aploplus achalus	1
Callimantis antillarum	1

HEMIPTERA.	
Thyanta perditor	1
Proarno hilaris	2

COLEOPTERA.	
Pyrophorus luminosus	1
Lachnosterna sp	1
Eburia sp	1
Lachnopus sp	2
Diaprepes spengleri	1
Rhyssematus sp	1

ARACHNIDA.	
Avicularia sp	1

MOLLUSCA	
Subulina sp	1

VIEILLOT'S GROUND CUCKOO. *Saurothera vieilloti* Bonaparte.

Pajaro Bobo, Pajaro de Agua, Pajaro Bobo Major.

The ground cuckoo is a fairly common resident species in Porto Rico. In spite of its large size it is very inconspicuous, and its long tail, instead of making it prominent, aids its protective coloration by giving it rather an unbirdlike contour. In passing through the trees, the birds usually keep to the densest foliage and make long pauses, during which they sit motionless or merely turn the head slightly. In early morning they may be found in dead trees or on exposed limbs, where they sit in the sun with drooping wings and ruffled feathers. They are very tame and show no fear of man. Though seen occasionally on the ground, they seem to spend most of their time in bushes and trees. The ordinary call notes, heard frequently, are cuckoolike and resemble the syllables *cow cow, kuk krrk* given disconnectedly. Sometimes a cuckoo would perch in the top of a tree, giving a sonorous almost ravenlike note, and on one occasion one was seen standing on a limb with trembling wings, giving utterance to a low cooing note. In some localities the name "pajaro de agua" was given them because of the belief that they called only before an approaching rain—a prophecy that usually came true. They were more common inland in the coffee plantations, but were encountered in the swampy forest near Mameyes and elsewhere near the coast.

A. and E. Newton[1] record one taken on Bieque (Vieques Island) by a collector for Apotheker Riise, of St. Thomas, the only known record of the bird outside the island of Porto Rico.

Food.—Tabulated results of examinations of 11 stomachs show 99.89 per cent animal matter. A small percentage of vegetable rubbish was found in two stomachs, but nothing that can be called true vegetable food was taken. Small lizards make up more than three-fourths of the bulk, and a few spiders, Lepidoptera, and cicadas form most of the remainder.

Lizard remains occurred in 10 stomachs, and in many cases small ones were found entire. Frequently, however, when torn in two, the contents of their stomachs (ants and small beetles) usually mingled with the food of the bird itself, so that care was necessary in separating this material. Four species of lizards were identified, but all the small ones found in the forests and coffee plantations are eaten. They make 78.56 per cent of the food. Spiders, frequently of large size, form 6.85 per cent, and cicadas (*Proarno hilaris*) 4.16 per cent. Caterpillars in six stomachs and moths in two together comprised 7.92 per cent. Coleoptera amount to only 0.92 per cent, and about half of this food consisted of weevil remains, the rest of fragments of longicorns (*Leptostylus* sp.) and a leaf beetle (*Mesomphalia* sp.). Earwigs were eaten three times and orthopteran remains occurred twice.

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[1] Ibis, 1859, p. 378.

In consuming such quantities of lizards this bird must be considered injurious, though to some extent it makes up for this by a diet of pernicious caterpillars, and in case of serious outbreaks of these pests this cuckoo could do good work in suppressing them. The bird is not common enough to make a reduction of its numbers necessary, nor under present conditions will it become so. Though many lizards are destroyed, they still hold their own. The ground cuckoo has from all accounts diminished greatly in numbers in the last 40 years and is no longer present in sufficient numbers to be of economic importance.

The following were identified in the stomachs examined:

HEMIPTERA.	
Proarno hilaris	4
COLEOPTERA.	
Leptostylus sp	1
Mesomphalia sp	1
Rhyssematus sp	1
ARACHNIDA.	
Theraphosidæ	1

REPTILIA.	
Anolis sp	7
Anolis cristatellus	1
Anolis krugi	2
Anolis gundlachi	1
Anolis stratulus	1

ANI. *Crotophaga ani* Linnæus.
JUDIO.

The ani is a common resident species in Porto Rico. These strange birds are found in flocks of from half a dozen to 20 or more, principally in pastures, but also in cane fields and orange groves, where they sometimes feed. In the pastures they remain near the cattle, keeping ahead of them with long hops, presumably to get the insects scared up. An intruder is greeted with a querulous call, and the whole flock goes stringing off across the fields to perch in a bush or low tree, where they crowd together and peer out curiously, their long tails and arched beaks producing an odd appearance. In early morning, when the grass is wet, they frequently sit with wings extended, drying them in the sun. The wings are small for the size of the bird, and the flight, a series of steady wing beats alternating with short sails, is not strong. In a heavy wind the birds are almost helpless and seldom rise very high at any time. When on the wing the back appears concave, as the head and tail are held higher.

On Culebra Island these birds fairly swarmed in the pastures. They are said formerly to have been as common on Porto Rico, but to have lessened in numbers greatly since the introduction of the mongoose. As they are much on the ground the mongoose could surprise them often. In the heat of the day they usually take refuge in the shade of dense clumps of bamboo along streams. They also roost in these at night, as well as in the mangroves around the lagoons. The ordinary call notes are a low *kur-r-rk*, and a querulous *quee ick quee ick* varied by low chuckling notes. When the birds are at all wild they serve to alarm the entire country, as they begin to call immediately upon perceiving a strange object. Although they occur in the pastures in the higher altitudes, they are not at all common except lower down.

The breeding season varies greatly. A female containing a fully formed egg was taken near Rio Piedras December 20, and breeding birds or young in first plumage were noted until field work was completed in September, so that apparently they nest the year round. Although these birds often build communal nests, this is not aways the case. Near Cayey, January 22, a pair were seen constructing a nest in a tree about 30 feet above a small stream, the male sitting on a limb above while the female was in the nest, as yet only a loose mass of sticks and weeds, moving and turning to shape it to her body, her long tail sticking nearly straight up in the air. July 25, near Bayamon, a single bird slipped quietly from a bulky nest in a clump of bamboos and only its mate appeared to join it. The nests seen ranged from 6 (Vieques Island) to 30 feet above the ground and were all large and bulky.

On May 20, near Yauco, three anis were seen in a tree in which several mozambiques had nests. The anis were right at the nests, and the blackbirds, together with a pair of gray kingbirds, were much excited, but appeared to be unable to drive away the intruders. The anis were evidently bent on robbing the nests, and one was shot in the act of gulping down something, which was found to be an egg. No other instances of this egg-eating habit were observed.

Food.—In 41 stomachs of the ani animal matter forms 91.3 per cent and vegetable 8.7 per cent. Orthoptera make up the largest item of animal food, with Coleoptera next, while large quantities of true bugs and caterpillars were taken. Vegetable matter was made up almost entirely of seeds and wild fruits, with a little rubbish secured with other food.

Animal food.—Orthoptera, the largest part of the food of this bird, form 41.58 per cent. Mole crickets (*Scapteriscus didactylus*) occur in five stomachs and make 5.69 per cent, forming an important element of the food. Locusts (Acrididæ) were eaten 21, and katydids (Locustidæ) 24 times, and these, with cricket remains in 6 instances, amount to 35.8 per cent. These are picked up on the ground and are all injurious insects. Predacious mantids were found in three stomachs, but compared with other Orthoptera form a very small bulk. The largest quantities of Orthoptera are found from December to May and the smallest in July and August.

Of Coleoptera, weevils (14.81 per cent) are the best represented, and are injurious almost without exception. The one occurring most is the destructive cane root-borer (*Diaprepes spengleri*), which was found in 14 stomachs and amounts to 7.09 per cent. The adult weevil is common in pastures and fields frequented by the ani and offers them an easily secured means of subsistence. It is known to feed not only upon the sugar cane but also upon the roots of orange trees. The larval form of this weevil, known as *el gorgojo-barreno de las raíces*, is safe from bird enemies except at plowing time, but the adult is open to attack at all seasons. The weevil stalk-borer, *el gorgojo-barreno in los tallos*, was eaten once. A single predacious ground beetle (*Calosoma alternans*) was eaten, as well as two others (*Selenophorus* sp.), of doubtful character. Leaf beetles amount to 3.61 per cent; among them a green diabrotica (*Diabrotica graminea*), known to injure cane and various vegetables by eating the leaves, was taken eight times. Miscellaneous beetles amount to 4.72 per cent and Scarabæidæ to 0.21 per cent, consisting entirely of small species (*Aphodius* and *Atœnius*). In this great mass of beetles only one ladybird (*Cycloneda limbifer*) was found.

Squash bugs (Pentatomidæ) form 9.24 per cent and were present in 22 instances. They are known to be more or less injurious and, unsavory and ill smelling as they are, appear to be freely eaten by the ani. Miscellaneous Hemiptera form 1.22 per cent and are composed of stray water boatmen and back swimmers with a few predacious ambush and assassin bugs and others.

Caterpillars were found in 17 stomachs and moths in 7, and form 9.71 per cent. In some cases almost an entire meal was made from caterpillars, one bird alone having eaten 38. Spiders were taken freely, but amount to only 4.08 per cent. Strangely enough, no cattle ticks were found, though it is the universal belief that the ani consumes many, and from that fact indeed is derived its generic name.

Miscellaneous animal matter amounting to 1.45 per cent is composed of a wide range of material. Fragments of a dragon fly, a dipteran, and crustacean remains each occur once. One stomach contained a peculiar flat platelike tooth from some fish, and only two contained lizard remains. The bird, shot in the act of robbing a blackbird's nest, contained large fragments of eggshell.

The following were identified in the stomachs of the ani:

ORTHOPTERA.	
Schistocerca sp	5
Schistocerca columbiana	1
Plectrotettix sp	6
Plectrotettix gregarius	2
Homorocoryphus sp	1
Conocephalus sp	1
Neoconocephalus sp	1
Neoconocephalus macropterus	1
Callimantis antillarum	1
Anurogryllus sp	1
Anurogryllus muticus	1
Gryllus assimilis	1
Scapteriscus didactylus	5

HEMIPTERA.	
Corixa sp	1
Notonecta sp	2
Zelus sp	2
Phymata angulata	1
Corizus sp	1
Catorhintha sp	1
Spartocera fusca	1
Edessa sp	1
Nezara sp	3
Proxis sp	2
Thyanta sp	4
Thyanta perditor	3
Margarodes formicarum	1

COLEOPTERA.	
Calosoma alternans	1
Selenophorus sp	2
Cycloneda limbifer	1
Monocrepidius bifoveatus	1
Aphodius lividus	1
Atænius stercorator	2
Chlorida festiva	1
Diabrotica graminea	8
Ceratoma denticornis	2
Lema sp	2
Coptocycla signifera	3
Chætocnema sp	1
Myochrous sp	1
Rhyssematus sp	8
Metamasius hemipterus	1
Lachnopus sp	4
Diaprepes spengleri	14

HYMENOPTERA.	
Spilochalcis sp	1
Megachile sp	1
Solenopsis geminata	1
Vespa sp	1

ARACHNIDA.	
Lycosa sp	3
Oxyopes salticus	7
Epeira sp	1
Argiope argentata	1
Attidæ	1

Vegetable food.—The vegetable matter (8.7 per cent) was made up largely of the seeds of the cherrylike moral (*Cordia* sp.), which occurred in 15 of the 41 stomachs. It is doubtful whether seeds themselves appeal to this bird, as there were few in the stomachs which did not have a more or less pulpy exterior. The gizzard is hardly fitted for grinding up flinty seeds and in only one stomach was a trace of gravel found. In the field the birds were seen eating the icaco (*Chrysobalanus* sp.). None of the fruits taken are in any way the product of man's labor. The following seeds were identified in the stomachs:

Whitetop (*Dichromena* sp.)	1
Palm (*Coccothrinax* sp.)	1
Espino (*Xanthoxylum* sp.)	4
Euphorbiaceæ sp	1
Moral (*Cordia* sp.)	15
Concombre (*Cucumis* sp.)	1
Compositæ sp	1

Summary.—The judio or ani may be considered entirely beneficial, as it destroys large numbers of highly injurious orthoptera, beetles, and caterpillars.

The only evil that can be attributed to it is not appreciable when compared with the services rendered: a few beneficial insects are destroyed and one bird had robbed a blackbird's nest, an occurrence believed to be exceptional. As a whole, the bird is a valuable aid to the landowner and should be carefully protected.

PORTO RICAN WOODPECKER. *Melanerpes portoricensis* (Daudin).
CARPINTERO.

The woodpecker is common in Porto Rico and on Vieques Island wherever there are trees large enough to afford it shelter. At present it is rather rare in the coastal region, as the forests have been cleared for many years. In habits and notes it strongly resembles the red-headed woodpecker of the United States, and has many of the habits of that bird. The flight is strong and undulating, as with other woodpeckers, and, while the birds are not wild, they are not easy to approach if they suspect they are being followed. This is one of the few species common in coffee plantations. The woodpecker finds a congenial home in the trees shading the coffee, and searches their trunks constantly for insects. Occasionally in the early morning, from January until May, they were heard drumming a rapid tattoo on a dead limb.

The birds were seen excavating nesting holes in February, and apparently deposited eggs from April 20 to May 1. At Yauco one nest was still empty May 17. By May 29 a few young were seen on the wing near Maricao, and from then on they were common. Adults were very vociferous and anxious about the young and fed them for about two weeks after leaving the nests. These birds apparently remain mated throughout the year. Woodpeckers were often seen in early morning sunning themselves on dead stubs, as the red-heads do, but, seemingly indifferent to the passing insects, they made no attempt to catch them.

Food.—In 59 stomachs of this woodpecker animal matter amounts to 65.83 per cent and vegetable to 34.17 per cent. Wood-boring larvæ, ants, and earwigs form a large share of the animal matter eaten, and small wild fruits, with a certain proportion of rubbish, make up the vegetable food. The material examined represented the food of all the months from January to August.

Animal food.—Earwigs (Forficulidæ) (8.55 per cent) were found in 40 stomachs, usually only the oddly formed tail forceps surviving the process of digestion. Only one species (*Phaulex albipes*) was identified and it is apparently common on the island. Not much is at present known regarding the status of these insects, but it is possible that some of the larger tropical forms may be of economic importance. Orthopteran remains (1.03 per cent) were found in three stomachs only. One cricket was eaten. Larvæ of wood borers mainly of longicorn beetles were found in 32 stomachs and, with adult longicorns in 3 others, form 24.68 per cent. This woodpecker, frequenting the coffee plantations, thus aids in ridding the shade trees, so essential to good crops of coffee, of their pests. By means of its strong bill and long tongue it can uncover and drag out these destructive larvæ, protected from other birds beneath the bark. Weevil remains in 13 stomachs amount to 1.47 per cent and other Coleoptera figure as 3.99 per cent. Darkling beetles were found commonly, as many of them live underneath bark. All were difficult of identification, as hard insects are thoroughly broken up before being swallowed. Among the Hemiptera, eaten by seven birds (4.16 per cent), were two stinkbugs (Pentatomidæ) and two cicadas (*Proarno hilaris*).

Next to the wood-boring larvæ, ants (10.37 per cent) form the largest single item, being found in 42 stomachs, in several forming a large part of the contents. One species (*Myrmelachista ambigua ramulorum*) found in 14 stomachs is very destructive in coffee plantations, where it makes canals in the pith of the new shoots of the coffee trees. When mature the shoots are frequently weakened so that they break when bent down by the pickers, injuring the trees and damaging the crop in many cases. One bird had eaten 81 of these ants, another 100, and others contained smaller numbers. A few caterpillars amount to 2.49 per cent and spiders to 1.37 per cent. The little arboreal tree toad or coqui (*Eleutherodactylus* sp.) was eaten by seven birds, and small lizard remains occurred in five stomachs, together forming 6.17 per cent. Miscellaneous animal matter (1.55 per cent) was made up of a single scorpion, whose sting was found in the stomach, a centipede, a wood louse, and two snails. Thus the animal food seems to consist almost entirely of material taken from the trunks of trees.

The following were identified in the stomachs examined:

CRUSTACEA.	
Cubaris sp	1
EUPLEXOPTERA.	
Phaulex albipes	2
ORTHOPTERA.	
Leucophœa surinamensis	1
HEMIPTERA.	
Proarno hilaris	2
Corixa sp	1
COLEOPTERA.	
Tropisternus sp	1
Atœnius sp	1
Leptostylus sp	1
Myochrous sp	1
Temnochila sp	1
Tenebrioides sp	1
COLEOPTERA—continued.	
Platydema sp	2
Helops sp	3
Platypus sp	1
HYMENOPTERA.	
Solenopsis sp	1
Myrmelachista sp	3
Myrmelachista ambigua ramulorum	14
Cardiocondyla emeryi	1
Monomorium floricola	1
Camponotus ustus	2
ARACHNIDA.	
Oxyopes salticus	1
VERTEBRATA.	
Eleutherodactylus sp	7
Anolis sp	3
Anolis krugi	1

Vegetable food.—Seeds and small fruits form 24.93 per cent of the food and vegetable rubbish, composed almost entirely of bits of wood, 9.24 per cent. The berries of various palms and small fruits borne by rubiaceous shrubs, many of which could not be identified, seem to be most relished. Fruits of the camacey (*Miconia* sp.) and palo moro (*Psychotria* sp.) were discovered by field observations to be favorites, and below El Yunque one bird was seen picking at the scales at the base of the fronds of a tree fern or jelecho (*Cyathea arborea*). None of the fruits or seeds eaten are of commercial value.

The following seeds were identified:

Arecaceæ	3
Palm (*Coccothrinax* sp.)	1
Palma de Sierra (*Acrista* sp.)	2
Wild fig (*Ficus* sp.)	5
Fresa (*Rubus* sp.)	2
Espino (*Xanthoxylum* sp.)	1
Euphorbiaceæ sp	5
Moral (*Cordia* sp.)	1
Compositæ sp	5

Summary.—In some localities the woodpecker damages coconut palms by digging nesting holes in them. Water gathers in these holes and the trunk decays until finally the tree is broken by the wind. As it takes these palms five to seven years to mature, this means considerable loss. However, it was found that woodpeckers occurred in the palm groves only where areas of lowland forest had been recently cleared, as at Punta Picua north of Mameyes, and that in the older groves they had not been seen for many years. It appears, then, that this is not a common habit with them, and that when discouraged the birds do not return. So that on the whole the woodpecker is to be considered beneficial. The only representative of its family in the region, it occupies a peculiar place in regard to insect pests, being able to combat those safe from the attacks of other birds and to aid in reducing the numbers of others less favored but none the less noxious. Where it does damage to the coconut groves a reduction of its numbers may be countenanced, but elsewhere it should be protected.

PORTO RICAN TODY. *Todus mexicanus* Lesson. (PLATE I. Frontispiece.)
SAN PEDRITO, MEDIO PESO, PAPAGAYO, BARRANCOLINO, VERDADON.

The tody was common over the entire island of Porto Rico, usually being absent, however, from the lowlands and never reaching clear to the coast. It frequents dense forests, coffee plantations, or the brush-covered banks of streams in damp localities, but is also common in the dry hills of the south coast where there is no water. Though brilliantly colored, this little bird is very inconspicuous, the green of the back resembling the vegetation, while in the coffee plantations even the bright red of the throat may be mistaken for a ripe coffee berry. Todies are tame little fellows, keeping usually in the low growth and coming up almost within arm's reach. On warm mornings, after a day and a night of fog and rain, they are found in the trees above the brush, and then their true numbers may be appreciated. When perching they sit nearly upright, the large bill at an angle of 45°. The ordinary note is a loud, harsh *pree* or *pree-ah*, entirely disproportionate to the size of the bird. In calling it rises to the full length of the legs and points the bill up. Another habit is to fly out with a loud whirring rattle of the wings, apparently made by the attenuate outer primary. This is under the control of the bird, as sometimes the flight is noiseless. The sound is made by both sexes, mainly from January to June, but is seldom heard after the breeding season.

This little bird is one of the few species common in the dense forests on El Yunque, though here the fogs and heavy rains seem to subdue them somewhat, and only occasionally do they break out into their loud notes. They are said to begin nesting the first week in March, and birds taken then showed earth stains on the plumage. Apparently the eggs are not deposited until May or June, the young birds being common in July. The first nest seen was near Yauco on May 24. A bird flew up from the face of a cut bank in a dry pasture, and on examination the entrance to the nest was found, a hole about 1¼ inches in diameter, showing the double path of an occupied nest. The tunnel went straight in through the hard earth for 10 inches, and then turned at a right angle, going 8 inches farther to the terminal chamber, a cavity 3 inches high, the same in width, and 5 inches deep. This nest contained three eggs, laid on the bare earth, of a size that was astonishing, considering the smallness of the bird. Each one was worked into a little hollow in the loose earth so that it was partly embedded, but even then it must have been a task for the female to cover them. They were a beautiful transparent white, showing a rosy reflection before blowing, and dull white afterwards. Another nest found in a claybank near Maricao June 3 consisted of a hole 1¼ inches in diameter and 8 inches deep leading into a circular chamber 3 inches across. The nest contained two eggs, so stained by the red clay that they appeared to be densely spotted. Young were first seen near Quebradillas July 5, and after that were common. At first their throats are plain, but red feathers soon appear, and then they resemble adults except for the shorter bill. The usual color of the iris in this species is grayish white, but in many it was plain slate.

These little birds are very active flycatchers, always watching overhead for insects, and capturing them on the wing with a loud snap of the bill, or picking them from the underside of leaves. In dry areas they frequently feed actively about the tips of twigs, and work through more open localities than is their usual habit.

Food.—In 89 stomachs of the tody, animal matter forms 97.62 per cent and vegetable 2.38 per cent. Flies, beetles, and small lantern flies form the most important elements of the animal food, and a few seeds compose the vegetable matter. In so small a bird the insects taken are of necessity of minute proportions, and from field observations little could be learned save that they seemed to feed to a considerable extent upon ants and small Homoptera.

Animal food.—Forty-nine of the birds taken had eaten odd, forcep-tailed earwigs, creatures of uncertain habit, and these form 9.4 per cent of the total. Orthoptera were seldom taken and amount to 2.28 per cent. The larger part of this is made up of grasshoppers, in six stomachs, while single birds had eaten a roach, a locust, and a mantis, all of small size. Small Homoptera, all of great economic importance, form 9.28 per cent. Small lantern flies (*Ormenis* sp.) are known to attack the young shoots of coffee, while leaf hoppers (*Tettigonia* sp.) are injurious to small crops and undoubtedly to larger trees. Other Hemiptera (1.11 per cent) comprise a miscellaneous assortment of ambush bugs, stinkbugs, and scale insects, the last two each found five times. The red scale (*Lecanium* sp.) was among those taken. Caterpillars in 9 stomachs and moth remains in 18 form 5.21 per cent. Though remains of Diptera figure as 30.88 per cent and were eaten by 65 birds, they were so broken and ground up that further identification was usually impracticable. Mosquitoes were identified certainly in one case and doubtfully in several others. They are, however, so easily broken up that they readily escape notice.

Beetles combined amount to 23.44 per cent, but the only useful ones found are ladybirds (Coccinellidæ). Though these occur in 21 stomachs, they amount to only 1.59 per cent of the total food. Snout beetles (6.47 per cent) were present in 46 stomachs. These can without doubt all be classed as injurious and alone more than outweigh the useful beetles eaten. Leaf beetles—Chrysomelidæ—(8.55 per cent) were present in 42 of the stomachs examined. Diabroticas and flea beetles of several species were the most common, and with them were others of uncertain economic position. As a whole, however, this family and the longicorn beetles (4.87 per cent) are to be considered injurious. The Hymenoptera eaten (4.33 per cent) weigh in the balance against the bird, as they are composed largely of parasitic chalcids and ichneumon flies. One peculiar sawfly, a plant-feeding species, with curiously forked antennæ, was found. Though many ants are consumed, one of their principal parasites (*Kapala* sp.) is eaten freely, being found in nine stomachs. Spiders in 38 stomachs amount to 8.17 per cent. Among the most unexpected discoveries were the remains of tiny lizards in five stomachs, and one can well imagine a vigorous struggle between this diminutive bird and some active anolis which objected to being swallowed. These with a few insect eggs amount to 3.52 per cent.

The following were identified in the tody stomachs examined:

ORTHOPTERA.

Plectoptera poeyi	1

HEMIPTERA.

Tettigonia sp	14
Tettigonia occatoria	1
Ormenis sp	6
Oliarus sp	1
Macrocephalus sp	1
Phymata sp	1
Geocoris sp	1
Lecanium sp	1

COLEOPTERA.

Hydrochus sp	2
Berosus sp	2
Cycloneda limbifer	1
Scymnus roseicollis	1
Scymnillus sp	19
Loberus sp	1
Tenebrioides sp	1
Microrhagus sp	1
Tylocerus sp	1
Catorama sp	1
Atænius sp	1
Atænius gracilis	1
Eburia sp	3
Leptostylus sp	3
Lepturges sp	1
Cryptocephalus sp	14
Cryptocephalus pusio	1
Diabrotica sp	1
Diabrotica graminea	3
Haltica sp	1
Glyptina sp	1
Cerotoma sp	6
Lema sp	2
Physimerus sp	2
Calandra sp	2
Platypus sp	9

DIPTERA.

Psilopus sp	7
Eristalis sp	1
Tetanops sp	1
Euxesta sp	8
Simulium quadrivittatum	1

HYMENOPTERA.

Kapala sp	9
Hyptia sp	1
Solenopsis sp	1
Solenopsis geminata	1
Macromischa sp	1

ARACHNIDA.

Mogrus sp	1
Epeira sp	1

VERTEBRATA.

Anolis sp	4

Vegetable food.—Little can be said regarding the vegetable food of the tody, as it is insignificant in volume. A small quantity of rubbish was present and the rest was composed of seeds found in 15 stomachs. None of those taken are of much importance, and they must be considered unaccustomed food for a bird otherwise insectivorous in its habits.

The following seeds were identified:

Wild fig (*Ficus* sp.)	1
Cenizo (*Chenopodium* sp.)	1
Fresa (*Rubus* sp.)	1
Espino (*Xanthoxylum* sp.)	2
Rubiaceæ sp	7

Summary.—Though considerable numbers of beneficial Hymenoptera and predacious ladybird beetles are eaten by the tody, they are more than counterbalanced by the great numbers of injurious lantern flies, leaf hoppers, beetles, and flies destroyed, and on the whole the bird is markedly beneficial. Its good work is confined largely to coffee plantations, and these fortunately will always furnish it shelter and protection. With encouragement it might in time come into the more open citrus groves, but at present it is largely limited to their borders. It should be given absolute protection in all localities.

BELTED KINGFISHER. *Ceryle alcyon alcyon* (Linnæus).

MARTIN PESCADOR, PITIRRE DE MANGLE, MATRACA, FRAILE MIGUELETE.

The belted kingfisher is a common winter resident near the coast, about lagoons and bays and along the larger rivers. It does not commonly go far inland, though one was seen along the Rio Caguitos near Caguas on January 10. Gundlach (1878, p. 218) records it as arriving from the north in September, and the last one I noted on Culebra was on April 21. The bird feeds on small fish, crawfish, etc., and occasionally one was noted about dry open spaces bordered with mangroves, where it was probably seeking small crabs. It occurs singly and is rather wild.

Food.—Of three stomachs examined one was entirely empty. The other two were taken at Mameyes in February, and in one were found remains of a crawfish, while the other bird had eaten a short chunky fish 3¼ inches long, seemingly too large for so small a bird to swallow. Under present conditions the kingfisher can not be considered as directly injurious and should be protected.

PORTO RICAN SHORT-EARED OWL. *Asio portoricensis* Ridgway.
MUCARO REAL, MUCARO DE SABANA, MUCARO DE MELON, CORUJA, LLORONA.

The Porto Rican short-eared owl is found only on the island for which it is named, and at present is almost extinct. Natives reported it as occurring at rare intervals in the grass fields of the lowlands at Rio Piedras, and it was also heard of among the lower foothills above Mameyes, near Salinas, Utuado, and Lares, where it was found in almost impassable growths of creepers and tree ferns. Near Utuado it was said to live and nest in small caves on the steepest hillsides, coming out only at night. One was said to have been captured there in the early summer (1912). Near Lares the natives believe that at night these owls swoop down upon an unsuspecting pedestrian, seize his hat, and carry it off into the "malessa" for a nest. This bird is no longer present in sufficient numbers to be of economic importance, and being a terrestrial species, its decrease must be laid to the mongoose. This species certainly has not been common within recent times, as Gundlach (1878, p. 165) did not see it in the seventies when he was on the island. He reports it from Toa Baja, Furnias, and Lares.

BARE-LEGGED OWL. *Gymnasio nudipes nudipes* (Daudin). (PLATES V and VI.)
MUCARO.

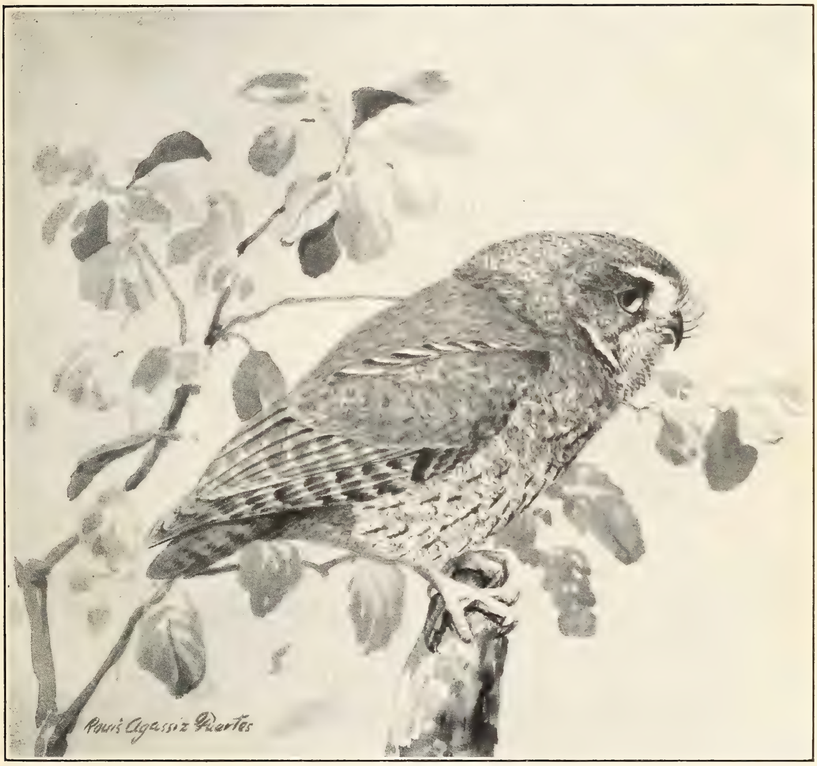
The little bare-legged owl is fairly common over the island of Porto Rico, but from its nocturnal habits may be easily overlooked. It was found most often in the coffee plantations in the hills, but was seen on the coast near Mameyes, and was reported from other localities. On the south coast it does not appear to be common.

During the day the birds roost in thick clumps of leaves, and are rather stupid, so that the natives frequently catch them by slipping a noose about the neck. The flight is swift and noiseless. Early in the evening their call is frequently heard, low and tremulous like that of a screech owl. It is given most often from November to May. When the bird is frightened or excited, its note is a loud *boo boo* like that of a burrowing owl. The small birds of the forest often discover this owl hiding in the leaves, and make a great fuss, but the owl remains motionless until they become tired and leave it. Near Maricao one flew out from a hole in a tree attracted by the calling of a wing-tipped vireo, and sat on a limb peering about until it was collected. From this hollow a young bird a week old covered with grayish white down was taken. The nest was a damp cavity, 6 or 8 inches deep, with two or three epiphytes growing before the entrance. May and June would seem to be the breeding months, as other young birds almost fully fledged were taken at Lares during June.

At Lares three were purchased alive, one of which was kept in captivity for four days, the others for a shorter period. The first was a peaceable little fellow, and allowed himself to be handled, stroked, or carried without attempting to bite or scratch, and stared about with big eyes, as though in constant wonder. On the second day of his captivity two more mucaros were secured, an adult female and a young bird, fully feathered. The young bird was introduced into the cage first, and the earlier occupant objected vigorously with sharp, barking notes, glaring down at the frightened intruder, which cowered in a corner. When the other adult was put in, however, it was too much, and the original bird, grasping it with one foot, began pulling out feathers with claws and bill while the stranger was too startled and dazed to attempt to defend itself. These birds were kept in a darkened room and were quite active during the day.

While the natives claim that the little owl does much damage to the coffee crop by biting the ripened berries, sucking the juices from the sweet inner skin, and then letting the berry fall, most of them admitted upon close questioning that no one had seen the birds doing this. The only known facts seem to be that the owls are heard calling in the coffee plantations at night, and in the morning the berries are found on the ground. The better-informed growers attribute the damage to rats, probably the real culprits. The matter was tested with the captive birds, and though it was only the latter part of June, enough ripened berries were found for the purpose. These were carefully counted and inspected, and for two days the first bird was offered nothing but coffee berries and water. At the end of this time the berries remained untouched, though the bird drank freely, and hunger made it very restless and active. It was then offered a large green grasshopper and a honey creeper. The former was swallowed at once, while the bird was carefully plucked, a process consuming 20 minutes, and then pulled apart and swallowed. For another period of two days the bird was given nothing but coffee berries and water, with the same result. Similar experiments with the other birds produced similar results. These experiments would seem to show that these individuals at least had no taste for coffee. In other localities, as at Mameyes, these owls were accused also of eating gonduros (*Cajanus cajan*), a species of legume, but without proof of any kind. The damage in this case was probably also due to rats.

Food.—Only five stomachs of the little bare-legged owl are available for examination, but the results are interesting. The food, as might be expected, is entirely animal. Orthoptera (14 per cent) comprises roaches, crickets, grasshoppers, and one mantis. One stomach examined was filled entirely with roaches, but this was not used in tabulation, as it was obtained from a native, and among the natives it is common to keep these birds in houses, where they feed extensively on roaches. One bird had eaten a mole cricket (*Scapteriscus didactylus*), a food which at night should be easily found by owls. Caculos or May beetles (*Lachnosterna* sp.), so destructive in many localities, were found in three of the five stomachs and amount to 24.4 per cent. One bird had eaten eight of them. Feeding at night, the little owl is peculiarly adapted to secure them, and with its capacious stomach can destroy large numbers. Cane weevil root-borers (*Diaprepes spengleri*) were found in two stomachs and amount to 1.8 per cent. Other snout beetles, mainly scarred-nosed weevils (Otiorhynchidæ), amount to 1.2 per cent, and miscellaneous beetles, longicorns, click beetles, and dung beetles form 8.4 per cent. Lepidoptera (7.8 per cent) are represented by a caterpillar eaten by one bird and moths taken by two. Lizards (10.8 per cent) were eaten by four birds, and evidence keen sight on the part of the owl. In two stomachs were found birds (17 per cent), one of which was a redstart (*Setophaga ruticilla*) and the other a Carib grassquit (*Tiaris b. omissa*). Miscellaneous animal matter (14.5 per cent) was composed largely of scorpions, which were swallowed, sting and all, and odd fragments of Hemiptera, none of them of much importance.


Louis Agassiz Fuertes

B2130—41

BARE-LEGGED OWL, OR MÚCARO (GYMNASIO NUDIPES NUDIPES).

B603M

STOMACH CONTENTS OF A BARE-LEGGED OWL, OR MÚCARO (GYMNASIO NUDIPES NUDIPES.)

The food of one múcaro consisted of 11 May beetles (*Lachnosterna* sp.) besides other insects and lizards shown in the two lower piles of fragments.

No trace of coffee, or, in fact, any vegetable matter, was found, thus confirming the results of the experiments detailed above. In the light of these data the mucaro must be held guiltless of injury in the coffee fincas. That these owls eat coffee berries appears like many other beliefs to be more tradition than anything else, and even some of the gibaros (hill people) admit that the belief has no foundation in fact, as is witnessed by a stanza in one of their songs.[1]

Though to a certain extent destructive to other birds, the fact that the bare-legged owl feeds so largely on May beetles and injurious weevils places it in the category of beneficial species. As an enemy of the caculo (*Lachnosterna* sp.) alone it merits full protection and conservation.

The following were identified in the stomachs examined:

ORTHOPTERA.	
Epilampra sp	1
Anurogryllus muticus	1
Scapteriscus didactylus	1
HEMIPTERA.	
Proarno hilaris	1
COLEOPTERA.	
Pyrophorus luminosus	2
Parandra sp	1
Atœnius stercorator	1
Lachnosterna sp	4
Compsa sp	1
COLEOPTERA—continued.	
Leptostylus sp	1
Lachnopus sp	1
Diaprepes spengleri	2
ARACHNIDA.	
Centrurus sp	1
Isometrus maculatus	1
VERTEBRATA.	
Anolis sp	4
Setophaga ruticilla (redstart)	1
Tiaris b. omissa (Carib grassquit)	1

CHUCK-WILL'S-WIDOW. *Antrostomus carolinensis* (Gmelin).
CAPACHO, GUABAIRO.

The last of December I saw a chuck-will's-widow in a small second-growth forest above the experiment station at Rio Piedras, and on January 11 Señor José J. Monclova, of that town, gave me a fine specimen. These birds are apparently rare but regular winter visitants to this region. Bowdish (1902-3, p. 365) records them from Vieques Island, December 15 and 28, 1899, and Gundlach (1878, p. 201) had one from Coamo Springs, and one from Arecibo in February, 1876. Stahl (1883, p. 61) says that they are very rare migrants.

Food.—The stomach of the single bird noted above was entirely filled with animal matter. The only thing that could be identified was a May beetle (*Lachnosterna* sp.), amounting to 15 per cent. From what is known of its habits in the North this species should feed on all of the common nocturnal beetles and moths.

WHIP-POOR-WILL. *Antrostomus vociferus vociferus* (Wilson).
GUABAIRO CHICO, GUARAIBA.

The only known species of the whip-poor-will from the island is a female taken by Clark P. Streator for Cory (1889, p. 276). I flushed a bird from a stump in the small forest above the experiment station at Rio Piedras December 23, 1911, and felt certain it was of this species. It is a very rare migrant.

CUBAN NIGHTHAWK. *Chordeiles virginianus minor* (Cabanis).
CREGUETE, CAPACHO, QUEREQUETEC, COMPACHO.

According to Stahl (1887, p. 451), the Cuban nighthawk is a rare summer visitant, arriving in April and leaving in October, and nesting on the island.

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[1] Abre múcaro los ojos;
Otro pajaro te engano.
Otro espipita el café,
Y tu trapao en la rama!

In his list of birds published in 1883 Stahl simply remarks (p. 61) that it is a migrant. Gundlach (1878a, p. 172) saw the species flying at Vega Baja, Dorado, and Bayamon; and Bello secured one at Mayagüez. Dr. C. W. Richmond (MS.) examined a specimen from the Stahl collection in San Juan in 1900. Sundevall (1869, p. 600) lists one in the collection sent by Hjalmarson. I did not see or hear of this bird.

GILT-CRESTED HUMMINGBIRD. *Microlyssa exilis exilis* (Gmelin).
ZUMBADOR.

The beautiful gilt-crested hummingbird was fairly common on Vieques Island March 16 to April 3 and one was taken on Culebra April 12. Sundevall (1869, p. 600) has recorded the species from Porto Rico, but according to Gundlach (1878, p. 224) specimens received from Hjalmarson are of uncertain origin and may possibly have come from St. Bartholomew. Hjalmarson himself was uncertain as to the exact locality.

Food.—In seven stomachs examined, animal food amounted to 100 per cent. Small homopterous remains which were found in one stomach made up 14.29 per cent, and flies in another, 5 per cent. Hymenoptera, among which were many fragments of ants as well as small parasitic species, were found in three stomachs and amounted to 26.42 per cent. Remains of small spiders (*Oxyopes* sp. and others) constituted 54.29 per cent. The small Homoptera taken are all injurious, but the parasitic Hymenoptera are beneficial. It was impossible, however, to determine just which of the hymenopterous insects were actually predacious and which were tiny flower-loving wasps and bees of no economic importance. The spiders, though predacious, can do as much harm as good, so that this hummer may be considered of no great economic importance but worthy of preservation because of its small size and beauty.

[**RUBY-THROATED HUMMINGBIRD.** *Archilochis colubris* (Linnæus).
ZUMBADOR.

Gundlach includes the ruby-throated hummingbird in his list, from a picture seen in Bello's album, but there is no other record. He mentions (1878, p. 226) a hummingbird sent him by Blanco in 1868 that resembled the female of this species, but had a tail like that of "Lampornis" (*Anthracothorax*). There is no certain basis for including it among the birds of Porto Rico.]

PORTO RICAN EMERALD, FORK-TAILED HUMMINGBIRD. *Chlorostilbon maugæi* (Audebert and Vieillot).
ZUMBADOR, ZUMZUM, COLIBRI, ZUMBADORCITO.

The small fork-tailed hummer is mainly a species of the coffee plantations in high altitudes, though on the dry south side of the island it ranges to the coast. These birds were frequently observed searching over and under the limbs of the trees and about the leaves and twigs of the coffee. They were seen in the coastal region at Manati only, on the north coast, and not again until Salinas was reached. In the eastern portion of the island they were found only on El Yunque, where they occurred sparingly up to 2,500 feet elevation, and were not seen again in the eastern portion until one was noted above Cayey. They are most abundant on the western end of the island from Aibonito west. Preferring deep shade, they use low perches in coffee trees, only going up to perch on dead limbs in the sun on cool, damp mornings. Their humming was heard many times when the birds themselves could not be located. On shaded slopes high in the mountains they sometimes fed in the open, among the low bushes. They are very pugnacious and pursue each other with sharp, squeaking notes.

The breeding season begins apparently the first of February, and full-grown young were common near Lares in June. The adults molt in May and June, and regain the full plumage by the first of August. The two long outer tail feathers in the male are very loosely affixed and easily lost. In young males the flesh-colored base of the mandible is less sharply defined anteriorly than in adults.

Food.—In 35 stomachs examined, representing the period from January to August, nothing but animal food (100 per cent) was found. In 5 stomachs were bits of sand and earth, forming considerable bulk in one or two cases. Lantern flies (Fulgoridæ) amount to 21.64 per cent, and other small homopteran remains, largely made up of the same forms but so badly broken as to be indeterminate, come to 12.76 per cent. Diptera were commonly eaten and amount to 15.64 per cent, and among the flies taken one mosquito was identified. Hymenoptera (6.28 per cent) were found in 9 stomachs. Small spiders, many of them immature specimens, were eaten constantly and form the largest single item in the food, 43.5 per cent. A little indeterminate animal matter comprises 0.18 per cent.

In consuming large numbers of small Homoptera, all injurious species, this tiny hummingbird does good work in coffee plantations, and, disregarding the spiders, the only beneficial insects in its food were the few Hymenoptera. As these are greatly outweighed by the injurious species destroyed, the bird may be considered beneficial.

The following were identified in these stomachs:

HOMOPTERA.		ARACHNIDA.	
Ormenis sp	3	*Leucage* sp	1
DIPTERA.		*Epeira* sp	2
Scatopse sp	1		
Agromyza sp	1		
Psilopus sp	4		

GREEN CARIB, BLUE-BREASTED HUMMINGBIRD. *Sericotes holosericeus holosericeus* (Linnæus).

ZUMBADOR.

The large blue-breasted hummingbird was common on Vieques, Culebra, and Culebrita Islands. Hjalmarson had two in his collection taken at Manati and Vega Baja (Gundlach, 1878a, p. 160), and these are the only records for Porto Rico itself. On Vieques it frequented the small areas of forest, and on Culebra was found in the mangroves about the bays. Although of swift flight, this bird does not seem so active as the other hummers, for while feeding it clung to flowers or twigs with its feet, or when this was impossible stopped frequently to rest.

Food.—The food of this hummer, as shown by 22 stomachs taken in March and April, was entirely animal. Small bits of vegetable rubbish were present in two cases, but amount to only 0.33 per cent. Small Homoptera, largely lantern flies (Fulgoridæ), and a few leaf hoppers, amount to 14.83 per cent. Anobiid beetles (*Catorama* sp.) of no particular importance were eaten twice, and these with one small weevil make up 0.83 per cent. Flies were commonly eaten and come to 7.14 per cent. Minute Hymenoptera, however, form the great bulk of the food and figure as 64.63 per cent, while small spiders come to 11.31 per cent. The balance (1.07 per cent) was composed of miscellaneous animal matter. Although large numbers of small Hymenoptera are eaten, it is possible that only a part are parasitic. All are undoubtedly picked up while searching flowers, and so perhaps are flower-feeding species of no economic value. They were in such condition as to preclude certain identification. These small insects fairly swarm about the blossoming muñecos and gonduros on the dry islands and offer an abundant food supply. This hummer, like the gilt-crested species, may be considered neutral until more is learned of the life histories and habits of the smaller little-known tropical Hymenoptera. In consuming numbers of injurious Homoptera it does a certain amount of good and in the destruction of flies it is likewise useful.

The following were identified in the stomachs examined:

HOMOPTERA.		DIPTERA.	
Tettigonia sp	1	*Psilopus* sp	1
COLEOPTERA.		ARACHNIDA.	
Catorama sp	2	*Gamasius* sp	1

GREEN MANGO. *Anthracothorax viridis* (Audebert and Vieillot).
ZUMBADOR, ZUMBADOR VERDE.

The hummingbird known as the green mango is confined to Porto Rico, and occurs mainly in the coffee plantations and inland forest growths, living either in the densest growth or in the borders of the woods. Only one was noted on the coast (near Mameyes), but a few were seen at Rio Piedras. In dry areas it was entirely absent, none being seen along the semiarid south side of the island nor in the region between Aguadilla and Camuy. When the forests were wet these birds were inactive until the sun was well up. When several were together they were very alert, pursuing each other and the smaller hummers like a flash. Occasionally in August, near Adjuntas, they gave a series of low twittering notes that might almost be called a song, while sitting quietly on a perch, but the usual note was a sharp squeak. Sometimes in collecting them they were attracted by the muzzle of the gun and hovered above it, advancing, retreating, and following after it.

The birds were gathering nesting material in December, and the 1st of February females were busy collecting the downy seeds of certain plants near Aibonito. On the 3d of February one was seen driving a wood pewee from a tree, and later on pursuing a flycatcher, and as I watched it it flew up and settled on the nest, which was about 40 feet from the ground, saddled on a limb in the top of a tall, slender tree. The nest was not finished, and the bird was busy arranging the lining, twisting around to mold it to her body. Every passing bird or insect was noted and her head was moving constantly. The male perched in the top of the same or neighboring trees, whizzing threateningly at all feathered intruders, large and small, but not coming near the nest. From other observations, the male and female remain together throughout the breeding season. Gundlach (1878, p. 222) speaks of finding fresh eggs in October.

The emajagua hedges (*Paritium tiliaceum*), with their large yellow flowers, were favorite hunting grounds with these hummers, as were the flowers of various trumpet creepers (*Ipomea* sp.). The birds were observed many times working over the trunks and large limbs of trees, apparently gleaning small insects from the crevices of the bark. Frequently when little clouds of gnats gathered in the air above the trees, these large hummers hung with rapidly vibrating wings, changing to one side or the other, and whirling completely around with the greatest celerity, while picking up the minute insects. When tired they came down to shaded perches, rested a minute, and then flew up again to continue as before. In the tobacco fields at Caguas they were accused of eating tobacco seed, but this hardly seems probable, and at any rate little damage would result. Near Cayey a bird worked over the ripened heads of some grass along a roadside, and though it may have been gathering insects, none were found on the seed heads on close examination.

Food.—In 29 stomachs animal matter amounted to 98.57 per cent and vegetable to 1.43 per cent. Two birds had eaten seeds, and a third a small quantity of vegetable rubbish, so that this undoubtedly is a regular, though small, part of the food. The largest elements in the animal food were small Homoptera, flies, and spiders. Nearly all of the stomachs were well filled with solid material, and, though these birds visit flowers systematically, as do all the other hummers mentioned in this report, large numbers of insects are captured within the corollas, and the part that nectar plays in the food is not so great as is usually believed. Certainly they are hungry for meat, as well as sweets. They undoubtedly regurgitate waste matter, in the form of pellets, from which the nutriment has been digested. Several of these, 2 millimeters long by 1 wide, ready to be expelled, were found on opening the stomachs, and in each case consisted of a firmly compressed pellet containing chitinous fragments of insects and spiders.

Small Homoptera were found in 9 stomachs and amount to 20.66 per cent, of which 16.35 per cent were certainly identified as Fulgoridæ. Engraver beetles (*Platypus* sp.) (7.77 per cent) occur in 7 stomachs. These beetles swarm in many localities but little is known of their habits in Porto Rico. Other Coleoptera, including a leaf beetle, a phalacrid, and a weevil (*Caulophilus* sp.), figure as 2.07 per cent. Diptera were found in 18 stomachs and form 28.47 per cent, while ants amount to 6.77 per cent. Other Hymenoptera, present in only 7 stomachs, represent 5.63 per cent. Spider remains in 11 stomachs come to 27.15 per cent and a single thrips (*Frankliniella insularis*) (0.05 per cent) completes the count. In taking this thysanopteran a hint is given of possibilities in the destruction of noxious species of economic importance. This large hummer can unequivocally be placed with the beneficial species and, though relatively small, does an appreciable amount of good.

The following were found in the stomachs of this hummingbird:

THYSANOPTERA.	
Frankliniella insularis	1
HOMOPTERA.	
Ormenis sp	2
COLEOPTERA.	
Caulophilus sp	1
Platypus sp	7
DIPTERA.	
Psilopus sp	5
Dilophus sp	1
ARACHNIDA.	
Theridula triangularis	1

PORTO RICAN MANGO. *Anthracothorax aurulentus* (Audebert and Vieillot).
ZUMBADOR, ZUMZUM, COLIBRI, ZUMBADOR DORADO.

A common resident species in the island, the Porto Rican mango frequents open localities, hedges through pastures, and bushy growths on open hillsides. It is the common hummer of the coast region, and though a few were found in the mountains, as near Cayey and Aibonito, they were not common in high altitudes, and were never found in dense forests. On Vieques Island they were the most abundant of humming birds but were rare on Culebra Island. They were very pugnacious, continually chasing each other, or even driving away honey creepers feeding in the same localities. In pastures they fed at the large flowers of the emajagua (*Paritium tiliaceum*), and spent much time in trees, gleaning over the bark, searching the trunks and twigs, and examining them closely. The throat of one taken in a grapefruit grove near Manati was filled with ants. On Vieques Island this species did not mingle with other hummingbirds, and fed largely at the flowers of the molinillo (*Leonotis* sp.). In the small meadows where these plants grew there were always a dozen or so of the hummers buzzing rapidly around, chasing each other back and forth, or probing the flowers. In March the young on Vieques were full grown, but on Porto Rico they appear to nest in May and June. A full-grown young of the year was taken near Ciales July 13.

Food.—Thirty stomachs examined represented the months from January to August, with the exception of June. Animal matter forms 98.57 per cent and vegetable 1.43 per cent, the latter consisting of a large seed of panic grass found in one stomach. The bulk of the animal food is composed of small Homoptera, Diptera, and Hymenoptera.

Small Homoptera found in 15 stomachs amount to 33.35 per cent, 13.21 per cent being recognized as lantern flies (Fulgoridæ). Leaf hoppers (Jassidæ) were taken twice. Snout beetles come to 3.26 per cent, and other Coleoptera, death-watch and leaf beetles mainly, to 5.97 per cent. One mosquito was identified. Remains of Diptera, which as a whole amount to 16.93 per cent, occur in 14 stomachs. Hymenoptera amount to 29.81 per cent; ants were found in 5 stomachs and other Hymenoptera in 26. Spiders were eaten seven times and amount to 7.80 per cent, while miscellaneous matter, mainly earwig remains, totals 1.45 per cent.

This large hummer has a rather varied insect fare and, though many Hymenoptera are eaten, they are compensated for by the injurious leaf hoppers, lantern flies, and beetles consumed. Though small, the hummingbirds have their own niche in the economy of life and do an appreciable amount of good. Movement as rapid as theirs requires quick consumption of fuel, and their stomachs, though small, must be filled frequently to keep up with the demand for muscle-building nutriment. In the quantity of small Homoptera eaten, the present species ranks near the warblers, and in the variety of beetles destroyed it exceeds any of the other hummers found in Porto Rico.

The following were identified in these stomachs:

HOMOPTERA.	
Ormenis sp	5
COLEOPTERA.	
Loberus sp	1
Haptoncus luteolus	1
Catorama sp	3
Cerotoma sp	1
DIPTERA.	
Psilopus sp	2
Conicera aldrichi	1
HYMENOPTERA.	
Solenopsis geminata	1
ARACHNIDA.	
Epeira sp	2
Epeira theii	1

JAMAICAN BLACK SWIFT. *Nephœcetes niger jamaicensis* (Ridgway).
GOLONDRINA, VENCEJO.

The Jamaican black swift is apparently a rare resident species. Gundlach (1878, p. 200) records it from Lares, Quebradillas, and Utuado, and notes young birds from the latter locality. One was hawking about the sugar experiment station at Rio Piedras on December 16, 1911, but the species was not again seen until May 4. On that date near Yabucoa I saw a pair circling swiftly back and forth, high above a pasture. One was shot as it passed overhead, and came tumbling down, its companion following. The latter circled by once or twice like a flash and then disappeared. The bird taken was only winged, and showed a curious semicircular tuft of feathers in front of and above the eye that strongly resembled the facial disk of an owl. This is not noticeable in skins. Single birds were seen three times during the latter part of June about Lares.

Food.—Two stomachs of this swift contain animal matter only, composed mainly of ants, which in one case amount to 91 per cent and in the other to 45 per cent. One species was identified (*Wasmannia auropunctata*), and one bird had eaten 157 individuals. In one stomach were five small stinkbugs (*Thyanta* sp.) and five flies (*Euxesta* sp.). Beetles were represented by a pea weevil (*Bruchus* sp.) and a sap beetle (*Stelidota* sp.). Several snout beetles (Calandridæ and Curculionidæ, including one *Caulophilus* sp.) and one engraver beetle (*Platypus* sp.) were taken. An unexpected species was a back swimmer (*Plea striola*), an aquatic form rather out of place in a swift's stomach. The black swift is entirely beneficial in its food habits. It is to be regretted that it is not more common, as it is the only member of its family present in Porto Rico.

GRAY KINGBIRD. *Tyrannus dominicensis dominicensis* (Gmelin). (PLATE VII.)
PITIRRE.

The gray kingbird, a common resident species in Porto Rico, frequents open localities and is found through pastures, cultivated fields, and waste lands from the coast to the higher portions of the island, but is not found in forests or coffee plantations. None were seen in the forests on El Yunque, though the bird was common in all the clearings about its base, and only two were noted near Maricao, which is in the heart of the coffee district.

The native name "pitirre" is in imitation of the call note, which is heard constantly when the birds are near, and which at times is lengthened and softened until it might almost be called a song. The flight is direct, moderately fast, and accomplished by rapidly beating wings. The gray kingbird has the reputation among the country people of being the earliest riser among birds. In the daytime it scatters along the slopes and through the fields to feed, but at nightfall gathers in small parties along streams, to roost in the bamboos or in the mangroves surrounding the lagoons. In Caguas, Adjuntas, and a few other places at eventide they were noted coming in to roost in the trees of the plazas. As it grew dusk considerable numbers came flying in, singly or in little groups of four or five. At first they alighted in the tops of rather high, open trees, and from here made sallies after passing insects, abundant in the early twilight, or flew swiftly and rather erratically through the trees, sweeping and diving, apparently merely for the pleasure of it. They were rather silent on these occasions. As it grew darker all retired to low, dense trees to roost.

The nesting season extends from April to July, and during the latter month young are abundant. At all times very pugnacious, pursuing blackbirds, hawks, and other birds, they now become doubly so, resenting all intrusions in their neighborhood. Occasionally they were seen standing on open perches during showers with outspread trembling wings, evidently enjoying the downpour. At times this species is semigregarious, being drawn together by an abundance of food. Birds were frequently observed capturing insects on the wing about high, breezy points in the mountains. Trees loaded with various fruits, as the guaraguou (*Trichilia spondiodes*) or wild fig (*Ficus* sp.), drew large numbers of them. March 6 along the Rio Mameyes, at the base of El Yunque, dozens of these birds came to feed on the fruit of the guaraguou. Seventeen were counted comparatively close together in one small tree. The laurel berries (*Phœbe elongata*) are ravenously eaten, although they are so large that the birds can scarcely swallow them. Where the fruit of the wild fig grows on slender twigs, the kingbird flies out and pulls it off, returning to a perch on the larger limbs to swallow it. Quantities of the berries of the balsamo (*Palicourea crocea*) and camacey (*Miconia racemosa*) also are taken. During August the young birds rely largely upon vegetable food.

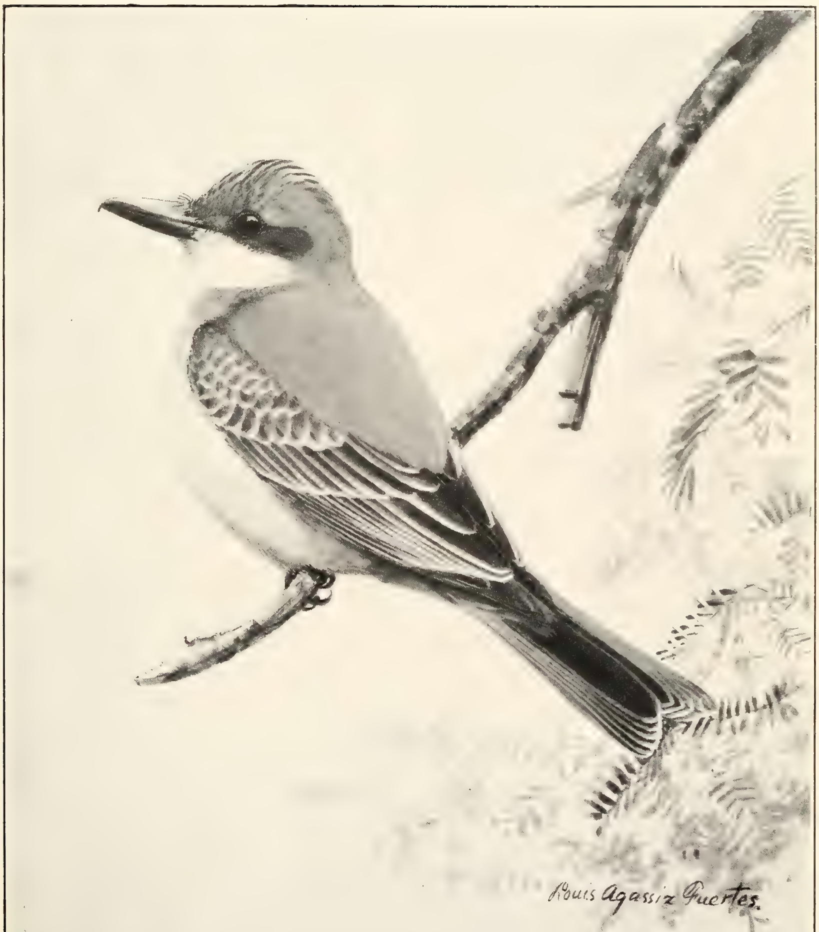
A few facts regarding the insect food of this kingbird were learned from field observation. Birds were twice observed eating the caterpillars of a large sphinx moth. These were beaten on a limb, and then the juices were extracted by working the body through the bill, while only the skin was discarded. Their services in eating these and other caterpillars were recognized, but at Caguas they were said to do some little damage by breaking the leaves of tobacco plants, either with the bill or the wing, in flying down to pick off the caterpillars. In Mayagüez in June a few of these birds were catching insects above the hot, paved streets, and perching on wires and housetops.

Food.—Eighty-nine stomachs of the gray kingbird available for examination were distributed through the 10 months from December to September, and revealed animal food to the extent of 77.56 per cent. The vegetable matter, 22.44 per cent, was considerable for a bird of this family. Many of the insects taken are large, conspicuous species and include weevils and other beetles, numbers of Hymenoptera, and a miscellaneous assortment from other orders. The vegetable matter eaten may be classed as wild fruits, all of them having a more or less pulpy mass surrounding a seed. These are swallowed whole, and when the soft exterior has been removed the hard seeds are regurgitated, no attempt being made to grind them up unless naturally soft. No gravel or sand was present in any of the stomachs examined.

Animal food.—Though mole crickets are popularly supposed to figure largely in the fare of the pitirre, they were discovered in only six stomachs and amount to only 2.36 per cent, while other Orthoptera, a mantis, and a few grasshoppers and locusts, come to 0.95 per cent. Earwigs (Forficulidæ) (4.72 per cent) were eaten eight times. Cicadas were found six times and make 1.97 per cent, while stinkbugs (Pentatomidæ) in nine stomachs come to 2.12 per cent. These evil-smelling insects seem to be eaten regularly, forming the largest bulk in December. Miscellaneous fragments of other bugs (Heteroptera) comprise 0.68 per cent. In 32 stomachs were found remains of adults of the cane root-boring weevil (*Diaprepes spengleri*) (17.19 per cent), and in destroying these weevils the gray kingbird does as much good as if it fed on the same number of changas. With the weevil stalk-borer (*Metamasius hemipterus*) (5.30 per cent) and miscellaneous weevils (1.34 per cent), largely coffee leaf-weevils (*Lachnopus* sp.), the bulk of injurious weevils taken is nearly one-fourth of the yearly food. These weevils, though just beginning to be recognized by agriculturists, are among the most important insects of the island from an economic standpoint and in destroying them a great service is done. In addition to these one bird had eaten a May beetle (*Lachnosterna* sp.) and other birds had taken buprestids (*Acmæodera* sp.) and leaf beetles. The only beneficial beetle eaten was a single ladybird (*Cycloneda limbifer*). Miscellaneous Coleoptera amount to 1.3 per cent.

Among the Hymenoptera, workers of the honeybee (*Apis mellifica*) (2.21 per cent) were identified in five stomachs collected at random in January and February. In 17 stomachs taken in June, largely at Lares about the apiary of Sr. Linares, domesticated bees form 9.12 per cent. This is the only damaging evidence against this bird, but it is greatly discounted by the good in other lines.

Considerable complaint against the gray kingbird arises around apiaries, the principal loss being said to occur during the nuptial flight of the queens, when the latter, from their relatively slow and heavy flight, are readily captured. The great swarms of these insects, passing back and forth to the hives, are an attraction to these insect-feeding birds. They were observed flying in, circling back and forth among the bees, and above the hives, and then alighting near by in dead trees. Wild species of bees of no economic importance amount to 15.28 per cent of the food. In making post-mortem stomach examinations of the birds taken about apiaries it should be borne in mind that wild bees also are relished, as these can not be distinguished from domestic species when discolored by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GRAY KING BIRD, OR PITIRRE (TYRANNUS DOMINICENSIS DOMINICENSIS).

digestive juices and mixed with other material without the aid of a microscope. Bees other than the honeybee figure largely in the stomachs taken about apiaries, and in the series taken in June amount to 9.35 per cent. Frequently birds taken near the hives, vigorously catching insects in the passing swarms of bees, contained no trace of honeybees, though observation would have led to the inference that their stomachs would be crammed with them. In fact, about as many bees were found in birds killed in fields and pastures as in those collected in the immediate vicinity of the hives. Moreover, as bees were found in but 5 stomachs out of 89, this should not weigh heavily against the bird when present in ordinary numbers, unless it is about at swarming time, when the queens are liable to be picked up.

Other Hymenoptera amount to 11.33 per cent and are composed largely of wasps. Caterpillars in ten stomachs and moths in four make up 4.75 per cent. Lizards, largely anolis, were eaten by four birds and amount to 3.64 per cent. One bird had swallowed an entire lizard 4½ inches long. Miscellaneous food, consisting of spiders eaten three times, ant lions (Myrmelionidæ) twice, one fly, and a small quantity of indeterminate matter, amounts to 2.42 per cent.

The following were identified in the stomachs of the gray kingbird:

ORTHOPTERA.

Schistocerca sp	1
Callimantis antillarum	1
Scapteriscus didactylus	6

HEMIPTERA.

Proarno sp	2
Proarno hilaris	3
Nezara sp	1
Zelus sp	2
Zelus rubidus	1

COLEOPTERA.

Cycloneda limbifer	1
Acmæodera sp	2
Lachnosterna sp	1
Solenoptera sp	1
Cryptocephalus sp	1
Coptocycla signifera	1
Diaprepes spengleri	32
Lachnopus sp	3
Metamasius hemipterus	14

HYMENOPTERA.

Tiphia sp	2
Elis sp	1
Pepsis sp	4
Priononyx sp	1
Oxybelus sp	1
Polistes sp	2
Polistes canadensis	1
Augochlora sp	4
Campsomeris sp	2
Campsomeris dorsata	2
Exomalopsis sp	2
Anthophora krugii	14
Centris versicolor	1
Bombus sp	1
Apis mellifica (worker)	5

VERTEBRATA.

Anolis sp	3

Vegetable food.—Of the vegetable matter eaten, seeds and fruits comprise 22.06 per cent, while vegetable rubbish amounts to only 0.38 per cent. The berries borne by the royal palm (*Roystonea borinquena*) and other species of the same family are favorites, as are those of the espino (*Xanthoxylum* spp.), a fruit with little pulp and a peculiarly reticulated seed. Seeds of various euphorbias and of plants of the nightshade family are also sought greedily, and one bird had eaten seeds of the Santa Maria (*Lantana* sp.), a pernicious weed not of major importance in Porto Rico though very troublesome under similar conditions in Hawaii. The moral (*Cordia* spp.) was perhaps the favorite, being found in 12 stomachs. The fruits eaten are all wild and none are of commercial importance.

The following seeds were identified in the stomachs examined:

Royal palm (*Roystonea borinquena*)	4
Palm (*Acrista* sp.)	1
Palma de Sierra (*Acrista monticola*)	1
Wild fig (*Ficus* sp.)	2
Chenopodaceæ sp	1
Phytolaccaceæ sp	1
Espino (*Xanthoxylum* sp.)	5
Espino (*Xanthoxylum martinicense*)	1
Euphorbiaceæ sp	4
Croton (*Croton* sp.)	1

Jatropha (*Jatropha* sp.)	2
Staff-tree (*Rhacoma* sp.)	1
Bejuco prieto (*Paullinia* sp.)	1
Laurel (*Phœbe elongata*)	1
Camacey (*Miconia* sp.)	5
Adelia (*Adelia* sp.)	1
Nightshade (*Solanum* sp.)	4
Aji (*Capsicum* sp.)	1
Boraginaceæ sp	1
Moral (*Cordia* sp.)	12
Moral (*Cordia nitida*)	1
Nigua (*Tournefortia* sp.)	1
Santa Maria (*Lantana* sp.)	1
Rubiaceæ sp	2
Balsamo colorado (*Hamelia patens*)	1

Summary.—Detailed study of the food of the gray kingbird shows it to be beneficial almost without exception. A few honeybees are eaten, but they are more than made up for by the large bulk of injurious weevils, mole crickets, and Hemiptera destroyed. Though not so great an enemy of the changa (*Scapteriscus didactylus*) as has commonly been believed, it accomplishes practically as much good in consuming cane root- and stalk-boring weevils and coffee leaf-weevils.

In the cultivated fields this bird should be encouraged by every means possible because of the good it does in destroying these insect pests. It is always fairly common in citrus groves, and the cane fields furnish favorite feeding grounds, but when the cane grows tall there are few elevated perches from which the bird may watch for insects. The planting of the jobo tree (*Spondias lutea*) at short intervals along fences and roads is recommended, as its rather straggling growth furnishes open perches and the spiny trunk is a bar to would-be nest robbers.

[**KINGBIRD.** *Tyrannus tyrannus* (Linnæus).
PITIRRE.

The kingbird is recorded by Hartlaub (1847, p. 611) and by Cory (1892, p. 108) without comment. Cory (1886, p. 245) includes Porto Rico in its range with a query, and as no specimens are recorded it is considered best to treat this species as hypothetical.]

PORTO RICAN PETCHARY. *Tolmarchus taylori* (Sclater).
CLERIGO.

The flycatcher known as the petchary is a common resident in Porto Rico and on Vieques Island. Its original home would appear to be in the forests, which formerly covered the island. It is common now through the dense growth of coffee plantations, and in citrus groves having good-sized trees. In the lowlands its habits appear to be changing, and it is scattered through pastures and fields where there are mango trees or clumps of bamboo. Shaded perches are chosen, especially during the heat of the day. The birds are quiet and not easily seen, as they usually perch where they are hidden by clumps of leaves. From these points they fly out after insects, sometimes for considerable distances. They are rather silent, the call note being a loud *pi ti tity*, heard most often in the breeding season. Near Cayey, in January, one was seen bathing by repeatedly darting down to the surface of a pool. These birds are pugnacious, but not so much so as the gray kingbirds.

The breeding season extends from March to June, and after the first of July young birds were common. In the dense forests of El Yunque they were nesting the first week in March, and scolded the crows with harsh notes when the latter alighted above their nests.

Food.—For examination in the laboratory 61 stomachs of the clerigo were available, collected in the months from December to August and in all districts of the island, including Vieques. Animal matter in these forms 76.91 per cent and vegetable 23.09 per cent. Several species of weevils, Hemiptera, Hymenoptera, and tree toads form the large bulk of the animal food. Wild fruits figure somewhat more extensively than in the case of the gray kingbird and are taken in the same manner. Its food also differs from that of the kingbird mainly in its small consumption of Hymenoptera, with a corresponding increase in the destruction of beetles and vertebrates, these differences in diet resulting from differences in habitat.

Animal food.—Though the mole cricket (*Scapteriscus didactylus*) was found in only 3 stomachs, it amounts to 3.04 per cent. Other Orthoptera, locusts (Acrididæ) in four cases and a cricket in one, make up 2.68 per cent. The largest item in the animal food, 18.47 per cent, is composed of the cane root-boring weevil, present in 29 stomachs. Remains of as many as six were found in a single stomach, though smaller numbers were the rule. One of these weevils forms a comparatively large bulk and usually they are well broken up, apparently before swallowing. The weevil stalk-borer (*Metamasius hemipterus*), another highly injurious species, was eaten three times and amounts to 1.53 per cent. Miscellaneous snout-beetles come to 2.4 per cent and were mainly coffee leaf-weevils (*Lachnopus* spp.). Among miscellaneous beetles (4.06 per cent) diabroticas (*Diabrotica graminea*) occur three times and a leaf beetle (*Cryptocephalus* sp.) twice. Metallic wood-boring beetles, whose larvæ live under the bark of decaying trees, were also well represented. Ladybird beetles (1.53 per cent), predacious species, were identified four times. Ill-smelling squash bugs were eaten 11 times and figure as 3.45 per cent, while Homoptera, largely cicadas, make up 2.47 per cent. Two other bugs, predatory species, taken by two birds amount to only 0.88 per cent. Moths were eaten by four birds and caterpillars by four, and combined these comprise 4.17 per cent of the food.

Though hymenopterous remains were present in 23 stomachs, they amount to only 8.22 per cent. Fragments of bees (2.12 per cent) were identified in four stomachs, none of them belonging to the domestic species, so that this large flycatcher is vindicated of the charges laid against it by owners of bees. While working around the apiary of Sr. Linares, at Lares, a number of clerigos were taken and their stomachs preserved. They did not come directly into the bee yard, as did the gray kingbirds, but remained in the trees around its border. Swarms of bees were continually passing and repassing, and the flycatchers were seen darting up among them and snapping up unlucky insects time after time. On examining the stomachs of these birds carefully, however, no honeybees were found, the gizzards being filled with the customary food of the bird. It has been said that the birds do not swallow bees, but work them through the bill to extract the juices of the body and then discard the rest. In extended observations, however, I saw nothing of this, and in the well-known feeding habits of the bird there is nothing to indicate that this is true. When a bird preys upon the vicious social wasp (*Polistes* sp.), individuals of which were identified in four stomachs, there is no reason to suppose that it would reject the body of the weaker honeybee because of its sting.

The little tree toad (*Eleutherodactylus* sp.) had been eaten by 10 of the petcharies examined and forms 8.81 per cent of the total food for the period under discussion. As this flycatcher perches constantly among the leaves and limbs of living trees, these small batrachians are often seen and devoured. Lizards (10.47 per cent), all anolis, were eaten by 18 birds. In consuming these vertebrates a small amount of harm is done, but this counts for little when the good accomplished in other directions is considered. One bird taken in a mangrove swamp at Mameyes had eaten a fiddler crab (*Uca pugnax rapax*), and the stomach of another contained bits of mollusk shell. These, with a small quantity of animal matter which could not be determined, amount to 4.73 per cent.

The following were identified in the petchary stomachs examined:

CRUSTACEA.	
Uca pugnax rapax	1
ORTHOPTERA.	
Schistocerca columbiana	1
Scapteriscus didactylus	3
HEMIPTERA.	
Proarno hilaris	1
Rocconota sp	1
Zelus sp	1
Nezara sp	1
COLEOPTERA.	
Coccinella sp	3
Cycloneda limbifer	1
Chrysobothris denticulata	1
Acmæodera sp	3
Photinus sp	1

COLEOPTERA—continued.	
Cryptocephalus sp	2
Diabrotica graminea	3
Lachnopus sp	4
Diaprepes spengleri	29
Metamasius hemipterus	3
HYMENOPTERA.	
Polistes sp	4
Campsomeris sp	1
Campsomeris dorsata	1
Odynerus sp	1
Odontomachus hæmatoda	1
VERTEBRATA.	
Eleutherodactylus sp	10
Anolis sp	17
Anolis stratulus	1

Vegetable food.—Vegetable matter that may be classed as rubbish amounted to 1.96 per cent, and seeds forming 21.13 per cent were found in 36 stomachs, or a little more than half those examined. Not so many species are eaten as in the case of the gray kingbird and some of the favored species taken by that bird are missing in the appended list, notably the moral (*Cordia*). Berries of palms and the fruit of the wild fig and espino (*Xanthoxylum* sp.) were well represented, while the others were scattering. None were of the least commercial value except possibly the concombre (*Cucumis* sp.), which everywhere in the island grows in a wild state. As in the case of the gray kingbird, no gravel was found in the stomachs examined.

The following seeds were identified in these stomachs:

Arecaceæ sp	1
Palmo real (*Roystonea borinquena*)	2
Wild fig (*Ficus* sp.)	3
Chenopodaceæ sp	3
Almendrillo (*Prunus* sp.)	1
Espino (*Xanthoxylum* sp.)	4
Bejuco prieto (*Paullinia pinnata*)	3

Adelia (*Adelia* sp.)	1
Nightshade (*Solanum* sp.)	1
Santa Maria (*Lantana* sp.)	1
Rubiaceæ sp	2
Camacey (*Miconia* sp.)	1
Concombre (*Cucumis* sp.)	1
Compositæ sp	1

Summary.—The Porto Rican petchary or clerigo is a beneficial species in the true sense and renders great assistance in suppressing numbers of injurious insects. Although a few predacious coccinellids and larger numbers of lizards and tree toads are eaten, the weevils, bugs, miscellaneous beetles, changas, and other Orthoptera destroyed show a large balance in favor of the bird. The bird has been accused of damage by owners of apiaries who believe that it eats many bees. This charge, however, is entirely unsubstantiated, though a number of birds were collected in the immediate vicinity of bee yards. In an island where large insectivorous birds are few this bird is one of the most beneficial of the native species and should be protected by all. The good that it does is not limited to the coffee plantations, in which it chiefly resides, as many of the weevils taken are serious pests in cane fields and elsewhere. The bird is beginning to appear in the more open cultivated lowlands, and if undisturbed in its chosen haunts in bamboos and mango trees should increase in numbers. Further plantings would tend to encourage it in the pastures.

ANTILLEAN FLYCATCHER. *Myiarchus antillarum* (Bryant).
Jui.

The Antillean flycatcher is a common resident on Porto Rico and Vieques, being evenly distributed but nowhere abundant. On April 6 and 20 their unmistakable notes were heard in the dense thorny forest growth on Punto Soldado, Culebra Island. As they have not previously been recorded from this island it is unfortunate that no specimens were secured. The birds are found in coffee plantations, in small patches of second growth along hedgerows, brush-filled ravines, or, where cover is near, even along the borders of cane fields. On El Yunque they occurred up to 1,800 feet altitude. In their habits they are very quiet and unassuming and may easily be overlooked. An open perch is usually chosen from which the birds may watch for insects, as in a small opening in the forest or along the border of a coffee plantation, though the perch is often in the dense leaves in the tops of trees. Insects are captured on the wing, and berries are occasionally eaten. In general appearance, habits, and notes the birds markedly resemble the western wood pewee. During the latter part of April and May birds were seen inspecting nesting holes, though no nests were found. July 5, along the Rio Guajataca, near Quebradillas, a party of three young, just out of the nest, was observed, and after this date young were common. Near Bayamon they were found in the citrus groves. By the superstitious countryman the note of the jui is regarded as the forerunner of news, and whether this be good or bad the bird gets the credit for it.

Food.—In 40 stomachs of the Antillean flycatcher, representing the months from December to August, animal food forms 84.17 per cent and vegetable 15.83 per cent. Hemiptera, weevils, and caterpillars comprise the bulk of the animal food with Hymenoptera in lesser quantities. The vegetable food, less in amount than in the two birds last described (*Tyrannus d. dominicensis* and *Tolmarchus taylori*), is composed mainly of seeds of wild fruits or berries.

Animal food.—Fragments of the mole cricket (*Scapteriscus didactylus*) (1.27 per cent) were found in three stomachs. As the birds are found occasionally watching for prey from low perches bordering the woodlands or even near cane fields, they have opportunity to destroy numbers of the changa. Other orthopteran remains (3.97 per cent) were found in seven stomachs. Grasshoppers and locusts are represented, and odd long-bodied walking sticks (Phasmidæ) were eaten twice. Homoptera, largely cicadas (*Proarno hilaris*), with a few fulgorids, figure as 7.67 per cent, and stinkbugs in six stomachs come to 2.33 per cent. Other bugs (all Heteroptera) amount to 2.62 per cent.

Among beetles, the longicorns in 11 stomachs make up 1.7 per cent, and leaf beetles (Chrysomelidæ) eaten by the same number of birds amount to 1.4 per cent. Among these are diabroticas and a corn leaf-eating beetle (*Myochrous* sp.). Another small chrysomelid (*Cryptocephalus* sp.) was found in six stomachs. The cane root-boring weevil, though represented in only five stomachs, amounts to 11.22 per cent. Other scarred-snout beetles, which were largely made up of the coffee leaf-weevil (*Lachnopus* sp.), identified seven times, come to 5 per cent. Additional weevil remains make up 3.09 per cent. Miscellaneous Coleoptera (1.04 per cent) include a bean weevil (*Zabrotes* sp.) and several darkling beetles (*Helops* sp.). Caterpillars, represented in 14 stomachs, and a few fragments of adult Lepidoptera together comprise 25.85 per cent. Diptera (1.45 per cent), almost entirely disregarded by the gray kingbird and petchary, were recognized in five stomachs.

Hymenoptera (10.51 per cent), a constant element in the food, were found in 20 stomachs, or half those examined. Individuals of wild bees occurred five times, but there was no trace of the domestic species. Wasp remains were found in three, an ant in one, and in another a small hymenopteran parasitic on ants (*Kapala* sp.). Less than half those consumed can be called beneficial.

One bird had eaten a lizard and one a tree toad, together forming 1.07 per cent. Snails were found in two stomachs, a dragon fly in one, a neuropteran in one, and some insect eggs in another. These miscellaneous items total 3.98 per cent.

The following were identified in the stomachs examined:

ORTHOPTERA.	
Neoconocephalus sp	1
Scapteriscus didactylus	3

HEMIPTERA.	
Proarno sp	1
Proarno hilaris	4
Ormenis sp	1
Nezara sp	1
Thyanta sp	1

COLEOPTERA.	
Acmæodera sp	1
Eburia sp	1
Compsa sp	2
Leptostylus sp	2
Cryptocephalus sp	6
Myochrous sp	1
Diabrotica sp	2
Zabrotes sp	1

COLEOPTERA—continued.	
Helops sp	4
Lachnopus sp	7
Diaprepes spengleri	5

HYMENOPTERA.	
Kapala sp	1
Exomalopsis sp	1
Polistes sp	2
Elis sexcincta	1

MOLLUSCA.	
Subulina sp	1

VERTEBRATA.	
Eleutherodactylus sp	1
Anolis sp	1

Vegetable food.—Of the vegetable food 1.94 per cent may be called rubbish and the remainder, 13.89 per cent, is composed of seeds, usually with a little of their pulpy exterior accompanying them. One bird had eaten 36 grass seeds (*Paspalum* sp.), but this is apparently an unusual food. The espino (*Xanthoxylum* sp.), a favorite, was found seven times. Others recognized were the moral (*Cordia* sp.), nightshade (*Solanum* sp.), and wild fig (*Ficus* sp.).

The seeds in the following list were identified in the stomachs examined:

Paspalum (*Paspalum* sp.)	1
Wild fig (*Ficus* sp.)	1
Chenopodiaceæ sp	2
Vetch (*Vicia* sp.)	2
Espino (*Xanthoxylum* sp.)	7
Nightshade (*Solanum* sp.)	2
Moral (*Cordia* sp.)	2

Summary.—The vegetable food of the jui may be dismissed with the statement that it is composed of wild species of no importance to man. In the animal matter, Hymenoptera, the large family containing wasps, bees, and many parasitic species, stand out rather prominently, but as more than half of those taken are known to be neutral, their destruction is of little importance. The vertebrates destroyed are of value to man, as they aid in the war on insects. Some of the predatory bugs may also be considered beneficial. These, however, though long in enumeration are small in bulk compared with the great mass of destructive weevils, beetles, squash bugs, and others forming the average daily food of the Antillean flycatcher. Only one-eighth of the animal food may be considered more or less indirectly beneficial to man and agriculture, and the remaining seven-eighths consists almost entirely of animals living contrary to human interests. Thus this species is a firm ally of agricultural interests in Porto Rico. Though retiring in habit, it is more common than is supposed by the casual observer and its whistled call note, regarded with superstition by the country laborer, may always be considered an omen of good fortune.

PORTO RICAN WOOD PEWEE. *Blacicus blancoi* Cabanis.
BOBITO, JUI, JUI PEQUEÑO.

The bobito, or wood pewee, is a tolerably common resident species in the western portion of Porto Rico. It is not recorded from the eastern half of the island beyond a line passing through Salinas, Aibonito, and Ciales. This bird frequents coffee plantations, small patches of second growth, or on the south coast the dry brushy pastures, but very few even of the country people are familiar with it, as it is so inconspicuous that it would be overlooked by one not acquainted with its habits. In the coffee plantations it is found on the slopes about the heads of small gullies, or on the middle portion of long, steep slopes. It usually selects open perches on dead limbs not far from the ground, from which it makes short sallies after insects. The call note of the males, a low tremulous *pree-e-e-e* given at times, with trembling wings, can not be heard more than a hundred yards, and is so ventriloquial that neither its direction nor the distance from which it comes can be determined. Frequently a bird will call from a perch not 30 feet away for several minutes before it is seen, so still does it sit and so well do its colors harmonize with the background. The females are silent, usually appearing suddenly on a limb, and without doubt are often overlooked. The breeding season is in May, though no nests were found, and in July and August the birds were molting badly. Near Cabo Rojo they were found in the mangroves bordering the seacoast lagoons, but nowhere else did they approach so close to the ocean.

Food.—The Porto Rican wood pewee is a true flycatcher, as in 29 stomachs taken in February, May, June, and August 99.17 per cent of the contents was animal matter and 0.83 per cent vegetable. The vegetable matter was contained in a single stomach taken May 1, 1912, near Salinas, and consisted of seeds of the espino (*Xanthoxylum* sp.). Of the animal food, Diptera and Hymenoptera form the largest elements, though many beetles are taken. A cricket (*Orocharis* sp.) was found in one stomach and amounts to 0.56 per cent. Homoptera (5.39 per cent) are composed largely of lantern flies and tree hoppers, though one bird had discovered a cicada. Other bugs (Heteroptera), all so broken or fragmentary as to be indeterminate, with the single exception of one stinkbug (Pentatomidæ), were found in three stomachs and amount to 1.45 per cent. Leaf beetles (3.19 per cent) were encountered in 10 stomachs. A small species of uncertain habit (*Cryptocephalus* sp.) was identified six times. Ladybirds (Coccinellidæ) (3.87 per cent) appeared in five stomachs; they are usually predacious species and are the only beneficial beetles taken. Those eaten are all native forms, none of the species recently introduced to combat the mealy bug in cane fields being found. An engraver beetle (*Platypus* sp.) (8.86 per cent) was identified in nine stomachs. These are common about coffee plantations in many localities, and as many as 43 were found in a single stomach. Other weevils, found in nine stomachs, amount to 1.84 per cent, among which was a curculio (*Anthonomus* sp.). Coleoptera not included above come to 2.43 per cent, among which were a water scavenger beetle, click beetles (*Monocrepidius* sp.), several longicorns, darkling beetles, and others. The beetles eaten, though nearly all small, cover a wide range of families and are largely injurious species.

Moths are represented in eight stomachs and a caterpillar in one, together forming 10.87 per cent. The former figure more extensively in the food of this bird than in any of the flycatchers previously mentioned and show that active prey is watched for and captured on the wing, the slower-moving caterpillars being unnoticed.

Of the total food, 23.07 per cent is composed of Hymenoptera, large numbers of which are parasitic species. Representatives of this order were found in

17 of the 29 stomachs examined, and among them fragments of three ichneumon flies and remains of several bees were identified. They are only exceeded in bulk by flies (37.15 per cent), which were eaten constantly and were present in 23 stomachs, in some cases comprising as much as 85 per cent of the bulk. Miscellaneous matter, consisting of a spider, a snail, and an earwig, amounts to 0.49 per cent.

The following insects were identified in the stomachs examined:

ORTHOPTERA.

Orocharis sp	1

HEMIPTERA.

Ormenis sp	1
Tettigonia sp	1

COLEOPTERA.

Copelatus sp	2
Cycloneda limbifer	3
Scymnus roseicollis	1
Scymnillus sp	1
Monocrepidius sp	2
Chrysobothris sp	2
Lema sp	1
Cryptocephalus sp	6
Zabrotes sp	2
Helops sp	1

COLEOPTERA—continued.

Mordella sp	1
Anthonomus sp	1
Platypus sp	9

DIPTERA.

Psilopus sp	1
Volucella sp	1
Sarcophaga sp	1
Lucilia sp	2
Pyrellia violacea	1
Euxesta sp	1

HYMENOPTERA.

Polistes sp	1
Exomalopsis sp	1
Halictus sp	1

Summary.—Though not large enough in body to cope successfully with the larger insect pests of the island, the Porto Rican wood pewee aids effectively in destroying smaller species, some of which are known to be injurious, while others may prove upon investigation to be of more importance than is believed at present. Some harm is done in the destruction of the parasitic Hymenoptera, which are inevitably snapped up by any true flycatcher continually on the watch for winged prey, but these are counterbalanced by injurious species of small Homoptera, moths, weevils, and other beetles as well as the flies destroyed. From its unobtrusive habits this pewee attracts little attention, but should be protected wherever found.

ANTILLEAN ELAINEA. *Elainea martinica martinica* (Linnæus).

RUISEÑOR PEQUEÑO.

The small flycatcher, known as the Antillean elainea, has not previously been recorded from this region, but was found to be tolerably common on the south side of Vieques Island from Porto Ferro east, on Culebra Island, and also on Culebrita Island and Louis Peña (Southwest Cay). It would appear to be a summer visitant, as it was not noted on Vieques until March 25, but after that time it was fairly common. All the birds taken appeared ready to breed. It is a solitary species, individuals being found considerable distances apart, in dense, almost impenetrable thorny growths of cactus and small trees. In habits it combines the characteristics of flycatchers and vireos.

Food.—In 10 stomachs of this species taken in March and April animal food amounts to 14.5 per cent and vegetable to 85.5 per cent.

The only animal food taken at all regularly consisted of spiders (2.4 per cent), found in three stomachs. One bird had eaten a large caterpillar and another two weevils. In one stomach was a leaf beetle (*Cryptocephalus pusio*) and in others bits of an earwig and a ladybird beetle (*Cycloneda limbifer*).

In eating so much vegetable food (85.5 per cent) the elainea differs markedly from our northern flycatchers, none of which approaches it in this respect at any season. It is very probable, as our knowledge of the food of tropical and subtropical forms of this large family increases, that numbers will be found to be almost wholly vegetarian in their diet. Certainly this seems to be the case with the species under discussion. Three stomachs were filled entirely with seeds and drupes and in all but one these formed much the larger share. The seeds of the family of euphorbias were sought for, and a nightshade (*Solanum* sp.) occurred three times. Several species found were indeterminate, but apparently all were eaten for the soft outer covering, the seeds being regurgitated.

The vegetable food of this species is not of importance, and what animal matter is taken is nearly all injurious to agriculture, so that wherever it occurs the elainea may be considered a beneficial species.

[**TREE SWALLOW.** *Iridoprocne bicolor* (Vieillot).
GOLONDRINA.

Gundlach (1878, p. 199) says that he did not observe the tree swallow in Porto Rico but records it from a picture seen in the album of Bello. Stahl (1883, p. 61), probably following Gundlach, remarks only that it is a rare migrant, so that, without definite specimens on record, it can be included only as a hypothetical species.]

BARN SWALLOW. *Hirundo erythrogastra* Boddaert.
GOLONDRINA.

Of the barn swallow Gundlach (1878, p. 197) says that it arrives from the north in September and passes on southward. A single bird was seen during the present work on February 16 near Punta Picua, north of Mameyes. It would seem to be an irregular visitant during spring and fall migrations. It is a member of a family whose species are entirely beneficial in their habits. During its brief stay on the island, it will probably be found only in the lowlands.

[**BANK SWALLOW.** *Riparia riparia riparia* Linnæus.
GOLONDRINA RIBERIEGA.

The bank swallow also is recorded by Gundlach (1878, p. 199) on the basis of a picture seen in the album of Bello, and later records are apparently based upon his statement. It may occur as a rare migrant from the United States, but must at present be included only as a hypothetical species.]

JAMAICAN CLIFF SWALLOW. *Petrochelidon fulva pœciloma* (Gosse).
GOLONDRINA, GOLONDRINA DE CUEVAS.

The Jamaican cliff swallow is a common resident species in Porto Rico, being most abundant on the western end of the island. A small number were observed at Humacao, but on the east coast few were noted, and none were seen on the south coast east of Salinas. For the most part confined to the coast region, they were found inland only in the northwestern portion extending from Lares through Utuado to Ciales. This small species occurs ordinarily in small parties, feeding above pastures, lowland meadows, or along the beaches. On the wing it is light and graceful and when feeding the flight is very uncertain, the bird frequently changing its direction. In August little bands of 25 or 30 fed over the lowlands and perched close together in twittering flocks on telephone wires. During heavy rainstorms they seemed to have a hard time keeping up against the downpour, as they continually struggled to rise and were as steadily beaten down. Such storms would, without doubt, prove fatal to birds not long out of the nest, with the flight feathers still soft and undeveloped.

This species breeds in colonies in May and June, and nests on overhanging faces of cliffs or in caves, a practice so universally recognized that "La cueva de las golondrinas" is a common appellation given to caverns in Porto Rico. In these a mud rim, made of pellets carried in the bird's mouth, is thrown up on the outer edge of small shelves or holes and behind this is placed a felted mass of plant downs from cactus and other plants to receive the eggs. From fragments of shells examined the eggs appear to agree closely with those of *P. lunifrons*, being white, spotted with reddish brown and lilac. North of Aguadilla about 40 pairs were nesting in small caves in cliffs over the ocean, some only 20 feet above the waves. All nests were back in holes, and the birds circled about calling excitedly in a close flock before the entrance, flying up two or three at a time to hover before them for an instant. There must be a great mortality here among the young, as there is no place for them to go on leaving the nest except out over the waves, and it was some distance to safety at the top of the cliffs. East of Lares in "La Cueva Pajita," a grotto 200 feet long and open at both ends, was a colony of about 300 of these swallows, some of them near the entrance, while others had built in so far that in the obscurity the birds could not be distinguished from the large bats that circled about with them. Some of the ledges supporting nests were so narrow that the sitting bird was forced against the wall, greatly abrading the breast feathers. As these abrasions occur only on one side, the bird must always have faced the same way while on the nest; both males and females incubate, as these were observed in specimens of both sexes. About this colony on June 20 immature birds were seen on the wing, following the parents and teasing for food, while others were still nest building. When tired the young birds perched in the leafy tops of trees.

A few of these swallows appear to be changing their nesting habits and method of nest construction by taking advantage of shelters provided by man. Inside the train shed of the Linea Ferrea del Oeste at Bayamon was a small colony building against the rafters, and one pair had built on a beam in the gable of a neighboring hotel. The nests were globular in shape, only two being seen with the long bottle neck found in the nest of *P. lunifrons*, and those two were imperfect. Most of these nests had only a large, roughly circular entrance in the side, and a few were mere platforms of mud, hardly inclosed.

The ordinary note of this swallow is a soft *chu chu*, and the males have a chattering, twittering song given while flying.

Food.—Thirty-six stomachs of this swallow were examined, taken in December and in the five months from April to August. The greater number were secured in the western part of the island. In these, animal food forms the entire content, as might be expected from observing the habits of the bird, vegetable rubbish occurring in one stomach only, and then in such small amount as to be inappreciable. Although true bugs (Hemiptera) and flies form goodly items, the major share of the food is taken from the great army of beetles especially common in tropical and subtropical regions.

Orthopteran remains found in a single stomach taken in July form 1.39 per cent of the total. Lantern flies (Fulgoridæ) in 11 stomachs amount to 3.47 per cent, and small species in allied families, with similar injurious habits, among which may be mentioned jumping plant lice (Psyllidæ), come to 1.08 per cent more. Stinkbugs (Pentatomidæ) occurred 16 times and figure as 7.63 per cent. Most of them were eaten in June, and bugs of this family amount to 22.58 per cent in that month. Bugs of the chinch-bug family (Lygæidæ) and others not determined come to 3.25 per cent.

Among the leaf beetles (Chrysomelidæ), which form 8.06 per cent and which were recognized in 22 stomachs, were the tobacco leaf-beetle (*Epitrix parvula*), found four times; the bean leaf-beetle (*Cerotoma denticornis*), likewise found four times; and a flea beetle (*Systena basalis*), found seven times. Other species were tortoise beetles (*Coptocycla signifera*), which attack the leaves of the sweet potato, and a leaf eater (*Myochrous* sp.). Leaf beetles belonging to the genus *Cryptocephalus* were found in 15 stomachs. Engraver beetles (*Platy-*

pus sp.), eaten by 29 of the birds, amount to 41 per cent of the food for the period under consideration. They are found in the food of all the months represented except December, though in July they amount to only 2.17 per cent. As many as 400 of these beetles were eaten at a single meal, and several birds had taken 200 or over. Near Aguadilla, in June, the swallows were capturing large numbers for their young, carrying them in the back of the mouth and below the tongue in a well-moistened mass. Other snout beetles amount to only 1.19 per cent, but were all small species. Cane shot-hole borers (*Xyleborus* sp.), of considerable damage in cane fields and also known to injure the shade trees of the coffee (*Inga vera* and *I. laurina*), were found in seven stomachs. Few beneficial species were destroyed. Rove beetles (Staphylinidæ), which feed upon decaying vegetable and animal matter, were eaten nine times, and ladybird beetles four. Together these form but 1.31 per cent, a small amount when compared with the large bulk of snout beetles consumed. Sap-feeding beetles (Nitidulidæ), eaten by eight birds, and water scavenger beetles, detected in five stomachs, together with indeterminate fragments of others, make 4.77 per cent.

Flies (16.07 per cent) were eaten regularly and occur in 20 stomachs; ants in 17 stomachs amount to 9.13 per cent. The latter were taken from clouds of males and females on their mating flights, and the numbers then destroyed mean more than when individual workers are eaten, as each queen may be considered the nucleus of a new colony. Miscellaneous Hymenoptera make up 2.67 per cent. A moth was found in one stomach. The stomachs of two adults contained bits of snail shell and gravel, and the stomach of a nestling taken in a cave contained a rough angular bit of gravel of good size. Very few beneficial insects are taken, the great bulk of the food consisting of directly injurious species. As the birds feed in loose flocks over a large expanse of territory they must exert considerable influence where found, and where insects are abundant they congregate to feed upon them.

From the foregoing it can readily be seen that the cliff swallow is one of the best friends of the agriculturist. Should the bird modify its breeding habits, as it now does in a few places, so as to resort to buildings erected by man rather than to caverns, every encouragement should be offered it and the nests should in no case be molested. Many believe that swallows bring vermin in their nests, but it is firmly established that man's parasites are not borne by our avian friends, and in case of unwelcome visitations the blame must rest elsewhere.

The following insects were identified in the stomachs examined:

HEMIPTERA.

Ormenis sp	3

COLEOPTERA.

Copelatus sp	2
Berosus sp	2
Cercyon sp	1
Cycloneda limbifer	3
Stelidota sp	1
Photinus vittatus	1
Cryptocephalus sp	13
Cryptocephalus pusio	2
Myochrous sp	1
Haltica sp	2
Epitrix parvula	4
Systena sp	1
Systena basalis	7
Cerotoma denticornis	4
Coptocycla signifera	1

COLEOPTERA—continued.

Euscepes porcellus	1
Caulophilus sp	1
Platypus sp	29
Baris torquatus	1
Tychius sp	1
Xyleborus sp	2
Xyleborus inermis	5

DIPTERA.

Eristalis albiceps	3

HYMENOPTERA.

Cardiocondyla venustula	1
Prenolepis sp	1
Ponera opaciceps	1
Wasmannia auropunctata	2

CARIBBEAN MARTIN. *Progne dominicensis* (Gmelin).
GOLONDRINA, GOLONDRINA DE IGLESIAS.

The Caribbean martin is a common summer resident in all parts of Porto Rico and occurs also in the island of Vieques. The first were seen at Cayey on January 23, and after this they were common everywhere. On August 16, while on the summit of the range above Adjuntas, martins were heard continually so high overhead that they could not be seen, and occasionally three or four would sweep down over the slopes for a few minutes. These were evidently migrant, as they were working steadily southward, though at this date in some localities martins were still feeding young. Stahl (1887, pp. 450, 451) says that they arrive regularly from the end of January to the first of February, and gives December 23 as the earliest date in eight years' observations. On the wing they are strong and vigorous, sweeping about in large circles, chattering, and calling loudly. The greater number remain close about the towns, perching on wires and roofs of houses, and feeding high overhead. Sometimes parties play about the mouths of lagoons and rivers, frequently darting swiftly down at a boat in the water, and then rising abruptly, only to repeat the performance. On cold rainy days they follow cattle in the pastures for the insects they frighten up, or for flies drawn by them. At Cabo Rojo a parrot in a cage screaming and talking interested the martins greatly. Four or five gathered on a wire above it, peering down, twittering, and lifting the wings nervously until, at some piercing shriek, they left precipitately.

This species was apparently mated when it arrived, and began at once to investigate holes in the church towers and eaves of buildings, with much calling and warbling. In the wilder localities a few sought their ancient nesting sites in hollow trees, though the greater number nest in the towns. Near Mameyes a male was seen disputing with a woodpecker the possession of a hole in a coconut palm, and a number were nesting here in suitable localities. On the estate known as Manantial, north of Guanica, about 30 were nesting in small openings in the sides of an old brick chimney 75 feet high, and birds were found occupying holes in trees near the Hacienda Catalina, and along the Rio Guajataca near Quebradillas. They were observed carrying nesting material as early as the 9th of February, but nest building seemed to be rather a dilatory process, and eggs were apparently not deposited before the 1st of May. The first young seen on the wing were observed at Comerio July 27, but fledglings were still being fed in the eaves of a church at Cabo Rojo the last of August, though apparently some of the earlier nesting birds had left the island. Only one brood seemed to be raised.

Food.—Twelve stomachs of the martin were examined, taken in the months of February and May. These contained animal matter only and usually were well filled. Though this small number can not serve as a true index to the food, it gives an idea of the tastes of the bird. A large number of stinkbugs were taken by nine of the birds, and for the two months amount to 24.17 per cent. Beetles (7.83 per cent) also were present in nine stomachs. Among injurious species were leaf beetles, flea beetles, and a small quantity of weevil remains, while others in the list following are of unknown economic tendencies in the Porto Rican insect fauna. Remains of flies, mainly so badly broken as to be indeterminate, come to 26.42 per cent and Hymenoptera to 33.41 per cent. The great bulk of the latter was wasps, only a few parasitic chalcids being found. Dragon flies (8.09 per cent) in five stomachs are the only beneficial insects taken in quantity. One bird had secured a small cricket (*Ellipes minuta*).

The martin is without doubt a beneficial species and one to be protected. A few parasitic Hymenoptera are consumed and a little more than 8 per cent of the food is made up of dragon flies, which destroy many mosquitoes, but these are balanced by the larger numbers of stinkbugs and flies eaten, not to mention many beetles. At Maricao, in the first days of June, thousands of the destructive termites or white ants were flying in the evenings and in the dusk a dozen or more martins circled back and forth through them, eating until they were satisfied. These insects feed upon wood and are very destructive, honeycombing the walls and floors of houses, and building enormous nests in the forests with covered passageways leading up the trunks of trees; thus in eating these the martins do good service. Apparently no attempt has been made to provide these birds with artificial nesting boxes, but there is no reason why this plan should not prove successful and permit the species materially to increase in numbers. At present the nesting sites suited to their needs are few.

The following insects were identified in the martin stomachs examined:

ORTHOPTERA.	
Ellipes minuta	1
HEMIPTERA.	
Thyanta sp	1
Thyanta perditor	1
COLEOPTERA.	
Tropisternus collaris	1
Hyperaspis apicalis	1
Carpophilus hemipterus	1
COLEOPTERA—continued.	
Cryptocephalus sp	1
Rhipiphorus sp	1
Caulophilus sp	1
DIPTERA.	
Eristalis albiceps	4
Compsomyia macellaria	2
HYMENOPTERA.	
Chalcis sp	1

PEARLY-EYED THRASHER. *Margarops fuscatus fuscatus* (Vieillot).
ZORZAL, ZORZAL PARDO, ZORZAL DE LOS PALMARES, ZORZAL NEGRO, TRUCHE.

The pearly-eyed thrasher is a resident species in this region. On the smaller islands it is very common, but shy and usually hard to secure, as it lives in the densest growths of brush, creepers, and cactus. In following the trails I would see one dart across ahead of me or fly up from the ground at one side, to be lost immediately. In habits it is remarkably thrushlike.

These birds are very curious, and were attracted by "squeaking," while the outcries of other birds always drew them. When singing they were easily approached, as with wings and tail hanging they sat on a limb, usually hidden by leaves. The song resembled the syllables *wheur, tel leur, tsee,* given brokenly with many variations, so that, while the notes themselves were pleasing, the whole effect was disconnected and rambling. The birds sing by the hour, and the monotony and persistency of the sounds become in time rather wearisome.

Food.—In 38 stomachs of this large, robust thrasher animal matter amounted to only 12.81 per cent, while vegetable food reached the large sum of 87.19 per cent. The animal food is scattering, being apparently whatever attracts the attention of the bird, nearly all of the insects taken being of large size. One bird collected on Culebra Island April 10 had eaten the nymph of a mole cricket (*Scapteriscus didactylus*). Other orthopteran remains (2.75 per cent) were found in six stomachs and among them may be noted a walking stick (phasmid) and a grasshopper (acridid). Weevils (1.36 per cent), occurring four times, included the cane root-borer (*Diaprepes spengleri*), a curculio, and others. Spiders (2.63 per cent), conspicuous in the fauna of the dry islands where the thrasher is most common, were eaten seven times. Two birds taken in the coast region had captured crustaceans, one of which was a fiddler crab (*Uca pugnax rapax*). The birds were seen a time or two in the mangroves peering down with great interest at the army of crabs marching about beneath them. Vertebrate remains, a tree toad and two lizards (*Anolis* sp.), amount to 1.45 per cent.

Besides these a caterpillar, a stinkbug, two earwigs, an ant, and a neuropterous insect were identified.

The vegetable food is mainly wild fruits or berries, though some of them have but little pulp surrounding the seeds. The seeds are in most cases regurgitated, as no trace of gravel for grinding them up and fitting them for digestion was found, though some were soft enough to be broken up by the stomach alone. Berries of palms were favorites and fruits of various shrubs of the family Rubiaceæ were eagerly sought. The espino (*Xanthoxylum* sp.) and berries of a palm (*Coccothrinax* sp.) were each found five times. A few of the seeds identified (*Hypoxis* sp. and *Sida* sp.) do not come in the category of fruits and berries, but with small quantities of vegetable rubbish may have been taken accidentally. None of the vegetable food consumed has any value to man, while the insects taken, though small in bulk, are of considerable economic importance. Thus the bird may be classed as beneficial. Hunting it for food should be prohibited, both because the bird is useful and because the hunter in pursuit of small birds does not always distinguish between species but kills indiscriminately.

Following is a list of the seeds identified in the stomachs examined:

Palmo (*Coccothrinax* sp.)	5	Adelia (*Adelia* sp.)	2
Palmo real (*Roystonea borinquena*)	2	Nightshade (*Solanum* sp.)	2
Star grass (*Hypoxis* sp.)	1	Moral (*Cordia* sp.)	2
Phytolaccaceæ sp	2	Tantillo (*Randia aculeata*)	3
Espino (*Xanthoxylum* sp.)	5	Balsamo colorado (*Hamelia patens*)	2
Jatropha (*Jatropha* sp.)	1	Bejuco de berac (*Chiococca alba*)	1
Bejuco prieto (*Paullinia pinnata*)	1	Palo moro (*Psychotria pinularis*)	2
Escoba (*Sida* sp.)	2		

JAMAICAN MOCKINGBIRD. *Mimus polyglottos orpheus* (Linnæus).

RUISEÑOR, SINSONTE.

In Porto Rico mockingbirds are common residents in the lowlands, only a few being seen above 1,000 feet elevation, though they were found in open pastures at the highest points visited; for example, near Aibonito, and on Mount Pelado above Cayey. They seem to thrive best in a dry climate, and are most abundant along the south coast, while on Vieques they are very common. As usual, these birds frequent the tree-dotted pastures, hedges, and thickets, though near Guanica they are common through the open cane fields, feeding on the ground in newly plowed lands, and following the fences through the cane, where there is no cover whatever. When flushed in the open fields they fly only short distances before dropping back to the ground. They are common also in the citrus groves around Bayamon and Manati.

In pastures and thickets they are shy and secretive, though the males, singing from the top of some tree or bush or flying up a few feet and then dropping back, are a conspicuous feature in the landscape. They sang most from January until July, after which they were silent except for their scolding notes. The nesting season extended from January until June, and after that young were common. In July and August they were molting. Nest building was noticed near Caguas January 5, and young birds a week old were found on Vieques Island April 3. Near Mameyes in February nearly all the birds noted were incubating. One pair here, by their outcries, drew attention to a small owl hidden in the brush.

In all the towns visited mockingbirds were prized as cage birds, and taking the young birds from the nest was a common practice. Usually they were taken when quite young, and their cages hung out in the bushes, where the adults could feed them. Fine singers among the males were valued as high as

$10 or $15. In the country one was occasionally seen in a rude cage made of a large calabash, with string laced across the opening to prevent escape.

Food.—In 49 stomachs of the mockingbird animal matter forms 31.21 per cent and vegetable 68.79 per cent. The birds were collected in all the months from December to August save June and are quite evenly distributed through the region under consideration. The smallest quantities of animal matter are found in January and April, 8.5 per cent and 8.14 per cent, respectively. Lepidoptera, largely cutworms, and Orthoptera compose the bulk of the animal matter and the vegetable food is made up of wild fruits and berries. The relative proportions of animal and vegetable food are practically identical with those found by Prof. Beal in the examination of a large series of mockingbirds from California.[1]

Animal food.—Five of the mockingbirds examined had eaten mole crickets (*Scapteriscus didactylus*) (3.62 per cent). Mention has been made of this bird's habit of feeding at times in cultivated fields far from its usual cover, and it is undoubtedly during such forays that these injurious insects are captured. Other orthopterous remains in 11 stomachs (4.84 per cent) are less important than the mole cricket, but in capturing them the bird does good service, as all are more or less injurious. The first mockingbird collected, taken at Rio Piedras in December, had eaten a cane root-boring weevil (*Diaprepes spengleri*), but this insect was not identified in stomachs subsequently secured. This with other weevils, among which was a coffee leaf-weevil (*Lachnopus* sp.), in four additional stomachs comprise 1.62 per cent. Other beetle remains (2.06 per cent) are all injurious species with the exception of two ground beetles (carabids). Among these others may be mentioned a leaf beetle (*Cerotoma denticornis*) and a tortoise beetle (*Coptocycla signifera*), while one bird had captured two wireworms, the immature form of the click beetle. Remains of Lepidoptera, moths in 2 stomachs and caterpillars in 19, come to 12.4 per cent. The latter in at least five instances were cutworms, several being found in a single stomach. These are destructive wherever found. Hymenoptera, largely ants, form 1.85 per cent. A few chalcid flies in one bird were the only beneficial species identified. Six birds had eaten spiders and one a mite, which amount to 1.11 per cent. Miscellaneous matter, mollusks, a biting bird louse (*Mallophaga*), and earwig remains figure as 2.15 per cent. Stinkbugs, which were secured four times, amount to 0.93 per cent.

The following insects were identified in these stomachs:

ORTHOPTERA.	
Plectrotettix sp	1
Homorocoryphus sp	1
Scapteriscus didactylus	5
HEMIPTERA.	
Thyanta sp	1
COLEOPTERA.	
Selenophorus sp	1
Atænius stercorator	1
COLEOPTERA—continued.	
Cerotoma denticornis	1
Coptocycla signifera	1
Diaprepes spengleri	1
Lachnopus sp	1
HYMENOPTERA.	
Campsomeris dorsata	1
Strumigenys sp	1
Pheidole fallax var. *antillensis*	2
Odontomachus hæmatoda subsp. *insularis*	2

Vegetable food.—The vegetable food of the mockingbird (68.79 per cent), though more than double the bulk of the animal food, has little economic significance. With the exception of less than 1 per cent of rubbish, it may roughly be called berries or fruits, all of wild species and none of importance to man.

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[1] Bul. 30, Biological Survey, U. S. Dept. Agr., 1907, p. 53.

Berries of several species of rubiaceous shrubs were eaten freely, while the moral (*Cordia* sp.) and roble guayo (*Bourreria bourreria*) were the greatest favorites. Small wild figs (*Ficus* sp.), which grow commonly all through the country, were found in six stomachs, as were seeds of the nightshade family (*Solanum* sp.).

Seeds of plants in the following list were identified in the mockingbird stomachs examined:

Palmo (*Coccothrinax* sp.)	2
Palmo real (*Roystonea borinquena*)	2
Wild fig (*Ficus* sp.)	6
Amaranth (*Amaranthus* sp.)	1
Espino (*Xanthoxylum* sp.)	2
Bejuco prieto (*Paullinia pinnata*)	1
Jatropha (*Jatropha* sp.)	1
Adelia (*Adelia* sp.)	1
Nightshade (*Solanum* sp.)	6
Moral (*Cordia* sp.)	5
Roble guayo (*Bourreria bourreria*)	9
Pendula (*Citharexylum fruticosum*)	1
Tantillo (*Randia* sp.)	2
Balsamo colorado (*Hamelia patens*)	3
Palo moro (*Psychotria* sp.)	2

Summary.—The mockingbird secures a little less than one-third of its aliment from the animal kingdom, the remainder being wild fruits and berries of no economic importance. In destroying noxious insects, as cutworms, weevils, and the notorious changa, it is a great aid to agricultural interests, and as such should be protected at all times.

PORTO RICAN THRUSH. *Mimocichla ardosiacea portoricensis* (Bryant).

ZORZAL, ZORZAL AZUL, ZORZAL DE PATAS COLORADAS.

The Porto Rican thrush is a tolerably common resident over the entire island, though less so on the dry south coast. It is a bird of dense, brushy areas, and in the hills it frequents coffee plantations, while a region of small streams, fringed with trees, running through brushy pastures, is also attractive. At times the birds run on the ground in the open, as robins do, but when flushed take refuge in thickets. When singing they mount to the top of a tree, perch in the thick leaves, and pay little or no attention to anyone moving about below. Their song, as with the pearly-eyed thrasher, is a series of disconnected notes, some of which are quite musical, and the whole effect is not unpleasing, though repetition makes it monotonous. Their note was a low *wheur-a*, like that of a thrasher, and they were called up frequently by " squeaking " or by a whistled imitation.

The breeding season extends from February to June, varying somewhat in different parts of the island. Near Mameyes in February, birds were seen going through a sort of mating display, male and female running about on the ground with heads drawn in, the tail spread wide, and thrown forward over the back, so that the white tips were prominent. Young birds were common in June and July, and at that time the adults were molting badly. Taylor (1864, p. 166) has described the bill, eyelids, legs, and feet as a bright yellow in life, but this does not hold good in a considerable number of specimens examined in the flesh; these parts were near flame scarlet,[1] becoming more orange in June specimens, which were molting badly.

Near Ciales thrushes were in small bands eating fruit of the laurel (*Phœbe elongata*), and near Añasco one was seen eating the berries of the moral (*Cordia* sp.) and repeatedly driving out a gray kingbird which attempted to alight in the tree. They relish also the berries borne by the royal palm (*Roystonea borinquena*).

Food.—Thirty-two stomachs of this thrush were available for examination, all of the months from January to August with the exception of April being represented in the series. In these 36.54 per cent of the contents is animal matter and 63.46 per cent vegetable. Caterpillars, lizards, and beetles form a large share of the animal food, while the vegetable portion is composed of seeds and pulp of wild fruits and berries.

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[1] Ridgway, Color Standards and Color Nomenclature, 1912 (Jan. 16, 1913).

Animal food.—The mole cricket (*Scapteriscus didactylus*) was eaten by two birds, though it amounts to only 0.86 per cent of the total, and other orthopterous remains in three stomachs come to 0.36 per cent. Beetles (3.86 per cent) were captured by four birds. One bird had eaten a cane weevil root-borer (*Diaprepes spengleri*) and another contained small bits of a wireworm, the larval form of a click beetle. Fragments of cutworms were present in four stomachs and unidentified caterpillars in six more, which combined give a bulk of 12.25 per cent of the total. Ant remains (0.93 per cent), occurring in eight stomachs, are the only representatives of the great order of Hymenoptera found in the study of the food of this bird. Bug remains (Heteroptera) (2.64 per cent) occur in only two stomachs. In one of these was an odoriferous stink-bug (*Thyanta* sp.), a morsel pleasing to an avian palate only. Snails (2.62 per cent) were picked up by four birds and undoubtedly figure regularly in the food of this thrush, because of its terrestrial habits. Lizards and tree toads amount to 8.41 per cent and are the only beneficial animals destroyed. One of the lizards eaten was a siguana (*Ameiva exul*) and in seven stomachs were remains of the common lagarto (*Anolis* sp). Two little tree toads (*Eleutherodactylus* sp.) were found. An earwig and two myriapods, included as miscellaneous items, come to 4.61 per cent.

Though only a trifle more than one-third of its food is composed of animal matter, this thrush is beneficial in its relation to agriculture. The only questionable portion of its food is that made up of insectivorous lizards and tree toads. When, however, the numbers of cutworms, beetles, ants, and bugs are arrayed against these the balance is decidedly in favor of the bird. Moreover, should any of the smaller vegetable-feeding snails be found injurious to crops this thrush would prove an ally against them.

The following were found in the stomachs of the Porto Rican thrush:

ORTHOPTERA.	
Scapteriscus didactylus	2
HEMIPTERA.	
Thyanta sp	1
COLEOPTERA.	
Diaprepes spengleri	1
HYMENOPTERA.	
Camponotus sp	1
Pheidole sp	1
HYMENOPTERA—continued.	
Pheidole fallax var. *antillensis*	2
Solenopsis globularia	1
MOLLUSCA.	
Planorbis sp	1
Choanopoma sp	1
VERTEBRATA.	
Eleutherodactylus sp	2
Ameiva exul	1
Anolis sp	7

Vegetable food.—Though the vegetable food of the Porto Rican thrush amounts to 63.46 per cent, none is of value to man. Berries of the camacey were taken and drupes of a nightshade (*Solanum* sp.) were swallowed entire. The small fruits of wild figs (*Ficus* spp.), growing as parasites or as true trees, were also relished, being found in five stomachs, and undoubtedly all the common wild fruits of the island are eaten in season.

The following seeds were identified:

Wild fig (*Ficus* sp.)	5
Tabonuco (*Dacryodes* sp.)	1
Bejuco prieto (*Paullinia pinnata*)	2
Camacey (*Miconia* sp.)	2
Camacey (*Miconia prasina*)	1
Nightshade (*Solanum* sp.)	3
Moral (*Cordia* sp.)	1
Balsamo colorado (*Hamelia patens*)	1

[**WOOD THRUSH.** *Hylocichla mustelina* (Gmelin).
TORDO.

Gundlach (1878, p. 170) saw a drawing of the wood thrush in the album of Bello, made from a specimen taken by Don Celedonio-Carbonell, of Cabo Rojo. Stahl (1883, p. 58) says that it is a very rare visitant, but noted no actual specimens. As this evidence does not appear sufficient to establish the wood thrush as a valid member of the Porto Rican avifauna it is included as hypothetical.]

PORTO RICAN CROW. *Corvus leucognaphalus leucognaphalus* Daudin.
CUERVO.

Formerly reported abundant over much of the island, the Porto Rican crow is now almost extinct. A few are said to occur below San Sebastian, and in the more inaccessible portions of El Yunque they are still fairly common. Occasionally small flocks come down from the mountains to the coast near Mameyes. There were formerly a few near Utuado, but Mr. L. B. Strube, of the Hacienda Jobo, says that none have been seen there for five or six years, though there is no apparent reason for their disappearance, as on his plantation at least they were not disturbed. In the region between Lares and Las Marias it was said that there was formerly a smaller species that had not been seen for many years, and it is possible that there were once two species on the island, as on Santo Domingo and Cuba to-day.

These birds have more the nature, habits, and call notes of ravens than crows. They seem to thrive only where there are extensive growths of natural forest, and when these are cut down the crow disappears. In March along the west fork of the Rio Mameyes they were breeding, the nests apparently containing both eggs and well-grown young. All were inaccessible, however, being located in the tops of the tall tabanuco trees. The adults kept well concealed in the leaves high above, and only by patient watching could they be located. They exhibited considerable curiosity, however, and once, when I was hidden in some tall grass, two flew down to examine the place. On a second visit to this colony all the birds left, going higher into the mountains, though every half hour or so four or five would come circling back, high in the air, and perhaps one or two would alight on a dead limb projecting above the forest, where they croaked and called, lifting the wings nervously. Later a flock of about 25 were found near the forks of the Rio Mameyes, but these were very wild, keeping entirely to the higher slopes. On days when it was cold and rainy on the summit of El Yunque they descended into the warmer valleys, as the parrots did, and when it cleared circled back to the higher peaks.

The ordinary call note is a high *klook*, or a deep *wal-lough*, varied by any number of indescribable gutturals and gabbling calls, with none of the vociferous cawing of our crows. The natives claim that the birds live for many years, and credit them with great sagacity, asserting that birds captured while young may be taught to speak a few words of Spanish. They are prized as food by the country people and were formerly hunted as game.

Food.—In nine stomachs collected around El Yunque in March animal food amounts to only 10.56 per cent, and is composed of fragments of a nestling passerine bird in one stomach and bones of tree toads (*Eleutherodactylus* sp.) in two others. The vegetable food (89.44 per cent), by far the larger part, is made up of wild berries and drupes of a number of species, several of which were unknown. The drupes of the tabonuco (*Dacryodes excelsa*) were found in three stomachs and a palm berry (*Acrista monticola*) in another, while seeds of rubiaceous plants were common. In the field the birds were observed feeding on the guaraguou (*Guarea trichiloides*), tabonuco, and jagua (*Genipa* sp.), and other fruits are added to its dietary as the seasons change. None of these are of economic importance, but the animals destroyed are all friends of man, so that the crow is an injurious species. Its numbers, however, are now so few and it is so closely confined to its restricted range that it has little or no influence on the balance of nature. Hence no destructive measures are necessary, and it should be conserved as an interesting species. Unlike the crow of the United States, it can not accommodate its habits to changed conditions and can be expected to survive only in the Government forest reserve on El Yunque de Luquillo.

LATIMER'S VIREO. *Vireo latimeri* Baird.

JULIAN CHIVI.

Latimer's vireo is a tolerably common resident species in Porto Rico, found in many localities, though having a local range. None were observed east of Trujillo Alto, Caguas, and Patillas, and in the western part of the island they were found only under certain conditions. The birds frequented coffee plantations somewhat, but were most common in the limestone hills, covered with dense brush and matted with creepers, a prominent feature of the landscape along the north coast. In the dry hills of the south coast also they were common and were perhaps most abundant in the forest growth along the Rio de la Lapa, back of Salinas. They worked industriously through the brush and tangles, sometimes high up in the trees, but more often near the ground. They exhibited some curiosity, and once one came out and scolded with a wrenlike chatter for several minutes, until the brush was full of peering grassquits, honey creepers, and spindalis. The females seem to be almost silent, but the males sing incessantly a sharply accented song, in imitation of which it gets its native name of *julian chi-vi.* There are two distinct strains in this song, and the bird sometimes changes from one to the other, repeating them 22 or 23 times a minute, frequently keeping this up for an hour. A quick scolding note like *chee chee chur chur chur* is sometimes heard.

The birds nested in April and May, and young birds were seen July 5 still following their parents with soft call notes. Bowdish (1902–3, p. 16) records immature birds taken as late as October. In May the males sang incessantly, frequently remaining on one perch for half an hour or so, but by the middle of June they were mostly silent.

Food.—Forty-three stomachs of this bird were collected, representing the food of every month from December to August, inclusive, except March, and it was found that 86.21 per cent of the contents by bulk was formed by animal matter and 13.79 per cent by vegetable. Orthoptera, Homoptera, and Lepidoptera are the largest items in the class of insects, while the vegetable matter is composed of seeds.

Animal food.—Even Latimer's vireo relishes nymphs of the mole cricket (*Scapteriscus didactylus*), which were found in 6 stomachs, though they amount to but 0.9 per cent. Grasshopper remains were found in 6 stomachs, and indeterminate Orthoptera in 10. One bird had secured a roach and another a mantis. All of these make up 21.77 per cent, a surprising amount for a bird of this family. The insects taken were almost entirely nymphs, though some larger adults were secured. Undoubtedly nearly all the unidentified material belonged to the family Locustidæ, as the members of this group are found largely in foliage. Of the true bugs, homopterous remains come to 15.1 per cent, much of which is formed by cicadas (*Proarno hilaris*), large morsels for a bird of this size. Many lantern flies and leaf hoppers also were secured, the first named being found frequently. Two assassin bugs and three stinkbugs come to 3.67 per cent. Leaf beetles (Chrysomelidæ) were found in 6 stomachs and amount to 2.76 per cent, while longicorn bettles make up 1.75 per cent. Snout beetles were found in 21 stomachs and, though amounting to only 3.26 per cent, are an important item, as they are all species of small size. The rice weevil (*Calandra oryzæ*), a species well known as a pest in stored grains, flour, and other foodstuffs, was identified three times. Miscellaneous beetles—click beetles, fireflies, buprestids, and others—amount to 3.56 per cent.

Caterpillars, all small, were found in 14 stomachs, and the remains of moths, frequently a mere trace of scales, in 7; these total 21.88 per cent, one of the most important divisions in the food. The remains of Diptera amount to 1.25 per cent, and Hymenoptera to only 0.92 per cent. The latter are mainly beneficial, in one stomach being found a parasite of ants (*Kapala* sp.), and in another a small bee. Spiders (6.29 per cent) occur in 12 stomachs. Three birds had eaten earwigs, and one had captured a tiny lizard. Miscellaneous matter makes up 3.1 per cent.

Latimer's vireo is entirely beneficial, the only valuable insects consumed being a few parasitic Hymenoptera and predacious ladybird beetles. In addition to these, the spiders may be considered of value; but arrayed against this meager showing are hosts of destructive beetles, bugs, and caterpillars. At present the birds frequent the coffee plantations, and, as they are common in places about the borders of citrus groves in brushy areas, they may in time extend their foraging into the groves themselves. It is rather surprising to find a small bird feeding upon the mole cricket, but this is understood when it is seen how largely other Orthoptera enter into its diet.

The following insects were identified in these stomachs:

ORTHOPTERA.	
Periplaneta sp	1
Scapteriscus didactylus	6
HEMIPTERA.	
Ormenis sp	1
Proarno hilaris	6
Thyanta sp	1
COLEOPTERA.	
Scymnus roseicollis	1
Monocrepidius bifoveatus	1
COLEOPTERA—continued.	
Acmæodera sp	2
Photinus sp	1
Eburia sp	2
Leptostylus sp	4
Cryptocephalus sp	5
Myochrous sp	1
Helops sp	2
Strongylium sp	1
Euscepes porcellus	3
Calandra oryzæ	3
HYMENOPTERA.	
Kapala sp	1

Vegetable food.—Though vegetable items come to 13.79 per cent in these stomachs, none are of commercial value, all being small wild berries. This is much more vegetable food than has been found in representatives of this family in the United States, and, as it occurs in 23, or more than half of the total number of stomachs examined, it may be considered a regular constituent of the food. The berries of the camacey (*Miconia prasina*) and espino seem to be the most favored. Every stomach taken in December contained large numbers of these seeds; for this month they form exactly one-third of the bulk, but in the following months they are more scattering. No sand or gravel was found, so that berries must have been eaten solely for the pulp, though some of the softer seeds may have been digested. The following seeds were found:

Paspalum (*Paspalum* sp.)	1
Vinagrillo (*Oxalis* sp.)	1
Espino (*Xanthoxylum* sp.)	8
Camacey (*Miconia prasina*)	11
Adelia (*Adelia* sp.)	1
Aji (*Capsicum* sp.)	1

[**RED-EYED VIREO.** *Vireosylva olivacea* (Linnæus).
BIEN-TE-VEO.

Gundlach (1878, p. 169) saw the red-eyed vireo figured in the album of Bello, who drew it from a specimen in the collection of Don Celedonio-Carbonell. This record is not considered sufficient to include the bird as a Porto Rican species, except as hypothetical. It might be easily confused with a worn or poorly marked specimen of the Jamaican vireo.]

JAMAICAN VIREO. *Vireosylva calidris calidris* (Linnæus).
BIEN-TE-VEO.

The Jamaican vireo is a common summer visitant to this region. The first one was seen near Mameyes February 14, and from that date on they were common. Ranging over the entire island of Porto Rico, they were found everywhere in coffee plantations, brushy pastures and ravines, and in shade trees about houses. Bowdish (1902–3, p. 16) remarks that apparently they are partially migratory, while Gundlach (1878, p. 168) says that they occur from February 14 to the end of August. In the National Museum is a specimen taken February 13, 1899, at Hucares, by A. B. Baker, of the Fish Commission, while Stahl (1887, p. 451) notes one February 5, 1887, the earliest date known for the species. Males seemed to arrive first and came in full song, while no female was actually taken until April 11, after which they, too, were common. On March 9 there was a migratory wave of these vireos, as in the morning at the Hacienda Catalina the coffee plantations were full of their songs but next day they were gone. In fall these birds had completed the molt by the first week in August, and on the 16th of that month their numbers suddenly decreased, after which they were evidently migrating, the last one being observed on August 31 at Cabo Rojo.

Slow and leisurely in habit, they work through the leaves and twigs, sometimes singing for several minutes from one perch and exhibting no fear. The song is a series of couplets, closely resembling that of the red-eyed species, and they have the usual scolding note of the vireos. The breeding season began the first of May and lasted through June. No nests were found, but at Lares June 29 a boy brought in a nestling and described the nest as being in a banana plant. A juvenal female in the National Museum was taken at Mayagüez May 30, 1901, by Bowdish. Throughout July young birds were common, either shifting for themselves or following their parents with a soft insistent *chit chit*, while the adults answered with another low plaintive note, different from the usual call. Two seemed to be the usual number in a brood. During the breeding season the birds have a circumscribed range. Often a male was found in a small isolated grove and remained there throughout the day. In August only a few were heard singing. The iris of this species is bright reddish brown.

Eighty-four stomachs of the Jamaican vireo were examined, distributed evenly through the months from February to August, and animal food was found to comprise 42.18 per cent and vegetable 57.82 per cent.

Animal food.—Remains of grasshoppers (Locustidæ) were found in three stomachs, elongated walking sticks (Phasmidæ) in two, miscellaneous Orthoptera in nine, and mantids in three. These in combination come to 6.34 per cent. Cicadas (*Proarno hilaris*) were eaten by six birds, a lantern fly (*Ormenis* sp.) by one, and other small Homoptera by three, all amounting to 6.37 per cent. Among other bugs one stinkbug (*Nezara* sp.) was identified and one squash bug (*Spartocera fusca*), both members of families whose species are injurious. These with bits of an ambush bug come to 1.92 per cent.

Leaf beetles comprise 1.51 per cent of the total bulk and the cane weevil root-borer (*Diaprepes spengleri*), found in three instances, 0.51 per cent. Other snout beetles, which in three instances were coffee leaf-weevils, amount to 3.35 per cent. Weevils as a class occurred in 32 stomachs, so that they are an important item in the food. Ladybird beetles were eaten five times, but only made 0.42 per cent. A few darkling, longicorn, and dung beetles amount to 0.64 per cent. Twenty-one birds had eaten caterpillars, which as vegetable feeders must be reckoned as injurious. They form the largest item of the animal food (9.7 per cent). Hymenoptera, at least half of which may be called beneficial, amount to 2.03 per cent. A wasp and an ant were identified among these. Diptera amount to only 0.21 per cent and were eaten by a single bird in February. Earwigs (0.83 per cent) were taken six times. Spiders (7.74 per cent), eaten by 30 birds, were taken in largest numbers in March and April. Little tree toads (*Eleutherodactylus* sp.) were captured twice, and with a very small quantity of miscellaneous matter make up 0.61 per cent.

The only harm done by this vireo is in the destruction of a few ladybirds, beneficial Hymenoptera, and tree toads. But to offest these are found much larger numbers of injurious beetles, bugs, caterpillars, and other insects, in destroying which great good is accomplished. The bird is especially useful in coffee plantations and it abounds there. It comes, too, about the villages and country houses, where it aids in ridding the shade trees of their pests.

The following were definitely identified in the stomachs:

HEMIPTERA.

Ormenis sp	1
Proarno hilaris	6
Phymata sp	1
Spartocera fusca	1
Nezara sp	1

COLEOPTERA.

Scymnillus sp	3
Cycloneda limbifer	3
Atænius stercorator	1
Eburia sp	1
Leptostylus sp	1

COLEOPTERA—continued.

Cryptocephalus sp	9
Myochrous sp	1
Helops sp	2
Lachnopus sp	3
Diaprepes spengleri	3

HYMENOPTERA.

Cerceris sp	1

VERTEBRATA.

Eleutherodactylus sp	2

Vegetable food.—Vegetable matter (57.82 per cent) was found in 80 of the 84 stomachs available for laboratory examination. It was composed almost entirely of wild fruits and berries, though frequently its presence was detected only by the seeds, the pulpy exterior having been completely digested. In some cases also only the skins of small fruits were found, so that possibly the pits are sometimes removed before swallowing. None of the fruits taken have any importance to man nor would their dissemination through seeds scattered by the birds be of any consequence. Those sought most eagerly may be determined from the list which follows:

Wild fig (*Ficus* sp.)	2
Espino (*Xanthoxylum* sp.)	9
Guaraguou (*Guarea trichilioides*)	11
Jatropha (*Jatropha* sp.)	2
Camacey (*Miconia* sp.)	2
Camacey (*Miconia prasina*)	1
Adelia (*Adelia* sp.)	15
Nightshade (*Solanum* sp.)	3
Aji (*Capsicum* sp.)	8
Moral (*Cordia* sp.)	6
Roble guayo (*Bourreria* sp.)	1
Tantillo (*Randia aculeata*)	1
Palo moro (*Psychotria brachiata*)	1
Concombre (*Cucumis* sp.)	1

AMERICAN REDSTART. *Setophaga ruticilla* (Linnæus).

REINITA, CANDELITA, COLI RUBIO.

The American redstart is a common winter visitant to Porto Rico. The last one for the spring I saw on Culebra Island April 19, and Dr. Richmond (MS.) noted one at Ponce April 16, 1900. Stahl (1887, p. 451), says that they arrive from the north in August. These birds frequent the mangroves, forest growths, and coffee plantations, and sometimes shade trees about houses. The greater portion seen were immature birds and females, though occasionally males in full plumage were observed. As always, these birds were very active, searching through the limbs for insects, and expertly catching insects on the wing. On El Yunque, in the dense forests, they were seen up to 1,500 feet altitude, and elsewhere in more open localities were found at the highest elevations. Next to the parula warbler this is the most common of the wintering warblers.

Food.—Thirteen stomachs of the redstart were examined, taken in December, January, February, and April, and in these animal food amounts to 100 per cent. Small lantern flies (Fulgoridæ) occur nine times and form 37.23 per cent of the total. Longicorn beetles make up 0.57 per cent, snout beetles 1.5 per cent, and miscellaneous species 2.54 per cent. All are classed as injurious species save a single ladybird beetle, so small that it is lost in the bulk of others. Moth remains amount to 11.75 per cent, while no caterpillars were eaten. Hymenopteran remains (6.67 per cent) were found in five stomachs. Approximately two-thirds of these are small species, probably of parasitic habit. One that parasitizes ants was definitely identified as a species of *Kapala*. Diptera (39.24 per cent) were present in eight of the stomachs examined. One bird had eaten a spider, and another insect eggs, both amounting to only 0.5 per cent.

Though present only in winter, this small warbler is a bird of economic importance. It destroys thousands of lantern flies, abundant in the trees and shrubbery, as well as many beetles, moths, and flies. A very small percentage of its food is taken from beneficial species of insects, the remainder being entirely injurious. This bird is entirely insectivorous and does not feed upon any of the abundant wild berries, a fact that increases its importance, as it destroys proportionately more insects than do the more or less vegetarian resident species of similar habit.

The following insects were identified in these stomachs:

HEMIPTERA.	
Ormenis sp	4

COLEOPTERA.	
Scymnus roseicollis	1
Leptostylus sp	1
Cryptocephalus sp	1
Mordellistena sp	1
Euscepes porcellus	1
Platypus sp	1

DIPTERA.	
Compsomyia macellaria	1
Eristalis albiceps	1
Sarcophaga sp	1

HYMENOPTERA.	
Kapala sp	1

NORTHERN YELLOW-THROAT. *Geothlypis trichas brachidactyla* (Swainson).
PICA TIERRA.

The northern yellow-throat is of uncertain status for Porto Rico. Hartlaub (1847, p. 611) includes it in his list, and Gundlach quotes this record. Stahl (1883, p. 59) says that it is a rare migrant, and Gundlach (1878, p. 187) remarks that it is a rare winter visitant, but does not say that he secured it. Cory (1892, p. 119) lists it for Porto Rico without comment.

WATER-THRUSH. *Seiurus noveboracensis noveboracensis* (Gmelin).
PIZPITA DE MANGLE, PIZPITA CHICA.

The water-thrush is a fairly common winter visitant in the coastal region of Porto Rico, being noted at Mameyes February 9 to 29 and Cabo Rojo August 30. Dr. Richmond (MS.) saw one at Arecibo April 1, 1900, and Bowdish collected one on Mona Island August 18, 1901, where he found them fairly common. I saw them on Culebra Island from April 6 to 19, and one was noted on Louis Peña Island (Southwest Cay) April 11. In life this water-thrush can not be distinguished from the next subspecies described, Grinnell's water-thrush (*Seiurus noveboracensis notabilis*), and part of the above records refer to the latter. Specimens of this form were collected only on Culebra Island April 6 and 12.

There is no reason to suppose, however, that it was not at least as common as *S. n. notabilis* in the other localities noted.

These water-thrushes occur only in the mangroves of the coastal region, where they are found about bays and lagoons feeding on the ground, and though their sharp call notes are heard repeatedly, the birds themselves are usually hidden. While I was watching for clapper rails they frequently came walking along through the mud and over the roots, teetering the tail incessantly. In April they were singing as clearly as in the North.

Food.—Two specimens of this subspecies and two of *S. n. notabilis* were collected and their food is considered together. Of these four stomachs one was taken at Mameyes in February and the other three on Culebra Island in April. Fly pupæ and a few adults were present in three stomachs and amount to 43 per cent of the total. Ants (24 per cent), of which one bird had eaten 40, were found in three stomachs. Water scavenger beetles were found in two instances and a hister beetle (*Hister* sp.) once. In one stomach were five water boatmen (*Plea* sp.) and another aquatic bug, and two contained the remains of small crabs (in one case of *Uca*). In single stomachs were found the jaw of an orthopteran, a lantern fly, and a bone from the head of a tiny fish.

In destroying ants and fly larvæ these birds are beneficial, and though few in number they aid in restraining these insects. Only part of the beetles taken may be considered beneficial, and these are relatively small in bulk. In working over the muddy floors of the great mangrove swamps they perform a service peculiar to themselves and one or two species of similar habits, and are of undoubted value.

GRINNELL'S WATER-THRUSH. *Seiurus noveboracensis notabilis* (Ridgway).
PIZPITA DE MANGLE, PIZPITA CHICA.

One Grinnell's water-thrush was collected at Mameyes February 14 and another on Culebra Island April 12. This is the first record from Porto Rico. In habits and actions it is similar to the typical subspecies, in the discussion of which will be found brief notes on its food. Both of these water-thrushes are beneficial.

LOUISIANA WATER-THRUSH. *Seiurus motacilla* (Vieillot).
PIZPITA CHICA.

The Louisiana water-thrush is a fairly common winter visitant to Porto Rico. The birds may arrive in September, though there are no positive records, and the first that I saw were at Cayey January 17. They were common in the mangrove swamps along the coast and inland followed the rapid streams, frequenting the parts bordered by brushy growth or running through coffee and banana plantations. The call note is noticeably higher than that of the other water-thrush, from which it can readily be distinguished.

Food.—In five stomachs collected at Cayey and Aibonito in January animal food forms 98 per cent, vegetable 2 per cent. Remains of flies (33 per cent) were present in three stomachs. Water beetles (Parnidæ and others) were found in three stomachs and leaf beetles in two. In one bird was a tree hopper and in two others were indeterminate bug remains. A dragon fly was found once and spider remains and bits of a scorpion twice. Three-fourths of the contents of one stomach was composed of fragments of a snail, and in another was found a tree toad (*Eleutherodactylus* sp.). Two birds had eaten seeds, in one case those of the aji (*Capsicum* sp.). In these birds the number of harmful insects consumed is slightly in excess of the beneficial species destroyed (including also spiders and the tree toad).

OVEN-BIRD. *Seiurus aurocapillus* (Linnæus).
PIZPITA DORADA.

The oven-bird is a tolerably common winter visitant to Porto Rico and Vieques Island. Bowdish (1902–3, p. 19) notes one October 14, 1901, as his first fall record, and Gundlach (1878, p. 175) says that they arrive in October. Birds were seen in the forests of El Yunque up to 900 feet elevation, and in the central part of the island they were observed at Aibonito (1,900 feet altitude). They frequent thickets and second-growth forests many times in dry localities. Here they feed on the ground, flying up to low perches when alarmed. They were entirely silent. In the coastal regions they are frequently seen in cane fields.

Food.—In 13 stomachs of this bird available for laboratory examination animal food amounts to 62.43 per cent and vegetable to 37.57 per cent. These birds were collected in the months from December to April, inclusive. In all these stomachs were considerable quantities of gravel, and all animal matter was ground very fine. Weevil remains (4.8 per cent) were present in four stomachs taken in April. Other beetle remains (9.63 per cent) in eight stomachs were so finely broken that they could not be determined. Ants were eaten by eight birds and form the large amount of 8.5 per cent. Other Hymenoptera make up only 0.4 per cent. Orthopterous remains (2.17 per cent) include a walking stick, a grasshopper, and others. A caterpillar (0.5 per cent) was found in one stomach and spiders (2.33 per cent) in three. Snails, in most instances broken up in very small pieces, were eaten by eight birds and amount to 30.17 per cent. A single tree toad comprises 0.93 per cent and miscellaneous animal matter 3 per cent.

The oven-bird is wholly beneficial in its food habits and is remarkable for the large number of ants eaten, as well as many weevils and other beetles. Snails are much relished, and form nearly half the animal food. A list of identified specimens in different classes follows:

COLEOPTERA.	
Euscepes porcellus	1

HYMENOPTERA.	
Wasmannia auropunctata	1
Cyphomyrmex rimosus	1

MOLLUSCA.	
Planorbis sp	1
Subulina sp	2

VERTEBRATA.	
Eleutherodactylus sp	1

Vegetable food.—Of the vegetable matter contained in these stomachs 36.9 per cent was composed of seeds and 0.67 per cent may be classed as rubbish. The oven-bird has a strong, muscular gizzard and takes large quantities of sand, so that the seeds are broken and ground until they are fit for digestion. None are of economic value, as may be judged from the list which follows:

Ichnanthus (*Ichnanthus pallens*)	4
Paspalum (*Paspalum* sp.)	2
Stargrass (*Hypoxis* sp.)	3
Camacey (*Miconia prasina*)	3
Concombre (*Cucumis* sp.)	2

PALM WARBLER. *Dendroica palmarum palmarum* (Gmelin).
REINITA, BIJIRITA DE PALMAS, BIJIRITA PALMERA.

A single specimen of the palm warbler, a rare winter visitant to Porto Rico, was taken in a mangrove swamp bordering the Rio Mameyes, north of Mameyes, on February 16, 1912. In the United States National Museum is a specimen taken January 8, 1899, at Caguas by A. B. Baker, and another from Arecibo, April 4, 1900, by Dr. C. W. Richmond. Bowdish (1902–3, p. 18) records them from San Juan February 12, March 10, and April 8, 1900. The stomach of the single bird collected at Mameyes was empty.

PRAIRIE WARBLER. *Dendroica discolor* (Vieillot).

Reinita, Bijirita Galana.

The prairie warbler is apparently much more common as a migrant than as a true winter visitant. Bowdish (1902–3, p. 19) records it on September 23, 1900, and the last birds seen in the present investigations were noted on April 10, on Culebra Island. In Porto Rico these birds occur at the highest altitudes (above Aibonito, at 2,000 feet), and are found in brushy growths, in pastures where there are thickets, and along the hedges of emajagua (*Paritium tiliaceum*). Dry, brushy growths back of the beaches also are favorite places, and many live in the dry forests of Vieques. In spring there was a marked diurnal movement toward the west, and on Vieques there were distinct waves of migration on March 19 and March 27. Another was noted on Culebra Island on April 9. In each case the birds were in company with many other warblers.

Food.—For the study of the food of the prairie warbler 15 stomachs, taken in December, January, March, and April, were available. Animal food forms the entire content. The largest single item in these stomachs is composed of Fulgoridæ, which comprise 42.78 per cent of the food and were found in nine stomachs. Other bug remains, mainly fragments of an ambush bug (*Phymata* sp.), make up 1 per cent. Three birds had eaten leaf beetles (2.9 per cent) and one a weevil (0.2 per cent). Other beetle remains, among which a longicorn, a skin beetle, and a click beetle were identified, make up 12.9 per cent. Caterpillars found by five birds and moths by two make 12.7 per cent, while fly remains in two amount to 0.35 per cent. Ants in four stomachs form 3.72 per cent of the total, while other Hymenoptera, captured by a single bird, come to only 0.1 per cent. The only questionable part of the food of this bird is found in the large number of spiders eaten (19.59 per cent). These are found in eight, or more than half, of the stomachs examined. Miscellaneous animal matter totals 3.76 per cent.

Among beneficial species the prairie warbler ranks high, as practically four-fifths of its food is composed of harmful insects. Its destruction of spiders is a questionable benefit, but it consumes such large numbers of lantern flies (Fulgoridæ) that there can be no doubt as to its usefulness. In common with other birds of the same family, the wood warblers, it feeds to a considerable extent on ants while in Porto Rico, insects that in the Tropics are very destructive.

The following were identified in these stomachs:

HEMIPTERA.		ARACHNIDA.	
Ormenis sp	2	*Wala vernalis*	1
Phymata sp	1	*Theridula triangularis*	1
		Tibellus sp	1
COLEOPTERA.			
Cryptocephalus sp	3		

BLACK-POLL WARBLER. *Dendroica striata* (J. R. Forster).

Reinita, Bijirita Estriada, Bijirita Rayada.

Gundlach (1878, p. 181) observed the black-poll warbler, a rare migrant in Porto Rico, in October at Aguadilla, and records one as seen at Bayamon. Stahl (1883, p. 139) had a male taken in Porto Rico in his collection, and (1887, p. 451) says that the birds arrive the middle of August.

ADELAIDE'S WARBLER. *Dendroica adelaidæ* Baird.

Reinita, Bijirita Adelaida, Bijirita Mariposera.

A fairly common resident species in Porto Rico, Adelaide's warbler occurs in most parts of the island, but is local in distribution. The only ones seen at a high altitude were in the limestone hills west of Cayey, at about 1,200 feet elevation, the birds being found elsewhere mainly below 500 feet. They are fairly common on Vieques also, and this is the first time they have been recorded from that island.

On the south side of Porto Rico they are found in dry forest growth covering the hills, and on the north coast in second-growth forest tangled with vines and creepers, and where these conditions are wanting the birds are not found. Quick and active in habits, they feed rapidly through the tips of the twigs, tumbling down through the limbs after a moth or flying out to capture an escaping insect on the wing. They are partial to dense tangles of vines, and, though not wild, it was sometimes hard to find them for this reason. The song of the male is a sudden trilling outburst, somewhat like that of the pine warbler (*Dendroica v. vigorsi*), and always there follow protesting notes from a female near by. The males sing at short intervals during the forenoon and evening and occasionally during the heat of the day. Many were seen along the Rio de la Lapa, back of Salinas, where they were exceptionally abundant.

The birds appear to nest in May and June, and young were first observed near Quebradillas July 3, but after that date they were common. Near Yauco, on May 22, a nest was found in a thicket, not quite completed. It was saddled in a forked limb of a bush, about 4 feet from the ground. Externally its construction was of gray moss, shading in perfectly with its surroundings, while the lining was of fine grass. Bowdish (1902–3, p. 18) secured a juvenal male near Aguadilla June 15. The birds were molting badly in August.

Food.—For detailed analysis 41 stomachs of this bird were available, taken in every month from December to August except June. These contained nothing but animal matter. Six birds had secured Orthoptera, 2.61 per cent of the total. Three of these had eaten grasshoppers (Locustidæ). Insects that were actually identified as lantern flies amount to 46.82 per cent, and were found in 24 of the stomachs, while remains definitely determined only as those of small homopterous insects come to 12.73 per cent more. Thus these insects, destructive to many cultivated plants, form a little more than two-thirds of the entire food. Other bugs, assassin bugs in two instances, form 1.84 per cent. One bird had taken 12 stinkbug eggs.

Beetles are well represented and, with the exception of ladybird beetles in three instances (0.05 per cent), are all harmful species. Skin beetles come to 0.28 per cent and longicorns to 5.81 per cent. Leaf beetles (1.92 per cent) were eaten by 11 birds. Among the weevils, curculios, found in seven instances, come to 3.33 per cent and other snout beetles amount to 2.53 per cent. A few miscellaneous Coleoptera remains figure as 0.36 per cent. Caterpillars were eaten 6 times and moths 11, all amounting to 11.23 per cent. Hymenoptera comprise 2.12 per cent of the food, and are mostly small parasitic species, though ants were eaten three times. Spiders (7.29 per cent) were eaten 14 times. Diptera comprise only 0.45 per cent, and miscellaneous animal matter 0.63 per cent. One tree toad (*Eleutherodactylus* sp.) was eaten.

Adelaide's warbler is one of the few endemic birds that draw their entire sustenance from the animal kingdom. Enormous numbers of small Homoptera are destroyed by these birds; in fact, from this group of insects alone is gathered more than two-thirds of the bird's entire aliment. Besides these, many harmful weevils and other beetles, caterpillars, moths, and other insects are destroyed. In capturing small numbers of ladybird beetles, parasitic Hymenoptera, and spiders, some damage is done, but this is compensated for many times over by the great numbers of injurious insects which form the bulk of the food.

The following were identified in the stomachs:

HEMIPTERA.	
Ormenis sp	5
COLEOPTERA.	
Scymnillus sp	1
Cryptorhopalum sp	3
Eburia sp	1
Leptostylus sp	3
Cryptocephalus sp	8
Metachroma sp	2
COLEOPTERA—continued.	
Euscepes porcellus	1
Apion sp	2
HYMENOPTERA.	
Kapala sp	1
AMPHIBIA.	
Eleutherodactylus sp	1

SYCAMORE WARBLER. *Dendroica dominica dominica* (Linnæus).
REINITA, BIJIRITA DOMINICA.

Sundevall (1869, p. 596) notes one specimen of the sycamore warbler received from Hjalmarson, while Gundlach (1878, p. 184) found it a common winter visitant from September to March. I did not meet with it.

MYRTLE WARBLER. *Dendroica coronata* (Linnæus).
REINITA, BIJIRITA CORONADA.

The myrtle warbler is a tolerably common winter visitant. The first was seen January 5 in the plaza at Caguas, and from then on it was noted occasionally in the forests and more open growth. In February, about Mameyes, there seemed to be some migratory movement among these birds. The last one was seen in the town of Isabel II, on Vieques Island, April 1.

Only four stomachs of this bird were secured in Porto Rico, so that the food can be merely indicated. Caterpillars completely fill one stomach and form one-fourth of the contents of another. The remains of small Homoptera are prominent in two stomachs. One bird had eaten a large number of Diptera, and small particles of beetles occur twice. Spider remains form three-fourths of the contents of one stomach and are found in small quantities in another. This is the only element in the food that counts against the bird, the majority of the insects taken being harmful species. From the meager data available this warbler while in Porto Rico seems to conform in food habits with the prairie warbler and others of the same genus.

BLACK-THROATED BLUE WARBLER. *Dendroica cœrulescens cœrulescens* (Gmelin).
REINITA, BIJIRITA APLOMADA.

Gundlach (1878, p. 179) records the black-throated blue warbler for the island on the strength of a drawing seen in the album of Bello and on a record by Don Tomas Blanco. Stahl (1883, p. 139) had a specimen in his collection from Porto Rico. I found it a rare winter visitant, noting the first at Rio Piedras December 22 and the last on Vieques Island March 27, when several were observed with other migratory warblers. On El Yunque, in March, they were fairly common in the dense forests. They scold vigorously at intruders, and their demonstrations attract all the other birds in the forest. Near Rio Piedras they were eating berries of the sapalo (*Palicourea riparia*).

Eight stomachs of this bird were collected and in these animal matter forms 75.5 per cent and vegetable 24.5 per cent of the contents. The vegetable food was found in the three stomachs taken in December and January and consisted of seeds of the camacey (*Miconia prasina*). Of the animal food 19.46 per cent is composed of lantern flies (Fulgoridæ), which seem to be favorites with all warblers. Remains of other bugs come to 6.87 per cent, while weevils of various sorts make the large sum of 14.25 per cent. Among them were found a coffee leaf-weevil (*Lachnopus* sp.), a shot-hole stalk-borer (*Xyleborus* sp.), and a curculio (*Euscepes porcellus*). Engraver beetles (*Platypus* sp.) were found in three stomachs. Longicorn beetles (2.17 per cent) were eaten three times. Miscellaneous beetle remains figure as 2.38 per cent. Though fragments of flies were found in two stomachs only, they comprise 10.09 per cent of the total. Moth remains were identified once and caterpillars twice, and together they amount to 6.7 per cent. In one stomach was an ant and in another small bits of a hymenopteran, which come to 0.96 per cent. Spiders were eaten three times and make up 12.62 per cent of the food.

The black-throated blue warbler shares with others of its family a marked taste for lantern flies and other small Homoptera, all harmful insects. One-eighth of the food, as shown in these few stomachs, is composed of spiders, but a larger portion is made up of injurious weevils, caterpillars, beetles, and flies. Thus, though a migrant species, this warbler has considerable economic importance. Because of its retiring habits it is little known, but may be discovered by those interested in birds who search for it.

CAPE MAY WARBLER. *Dendroica tigrina* (Gmelin).
REINITA, BIJIRITA DE COSTA.

The Cape May warbler is recorded as a winter visitant from fall until May by Gundlach (1878, p. 178), while Sundevall (1869, p. 596) received from his collector many specimens taken in winter. At present it appears to be rarer, as Bowdish (1902–3, p. 18) saw but one at Mayagüez, October 30, 1901. I saw a single bird on Vieques Island April 4.

MAGNOLIA WARBLER. *Dendroica magnolia* (Gmelin).
REINITA, BIJIRITA MANCHADA.

The magnolia warbler is a rare migrant and winter visitant. The only certain record is that of Bowdish (1902–3, p. 18), who found it at San Juan September 26, 1899, and Mayagüez December 26, 1900. Gundlach knew the bird merely from a drawing in the album of Bello.

PORTO RICAN YELLOW WARBLER. *Dendroica petechia bartholemica* Sundevall.
CANARIO DEL MANGLAR, REINITA.

The Porto Rican form of the yellow warbler, a common resident, has a peculiar distribution, being confined entirely to the coastal plain and coming inland along the courses of the rivers to the base of the foothills. It never goes farther, except around Quebradillas, where the birds were distributed over the high flats 300 or 400 feet above the sea. In December and January, in the region about San Juan, these birds were confined mainly to the mangroves and the narrow strips of bushes immediately back of the beaches, but by the first of February they began to appear inland more frequently and were common about Rio Piedras in shade trees near houses. Whether its distribution is similar in other portions of the island can only be determined by further observation. At Bayamon they were found in scanty growths of grass and weeds on the gravel bars in the Bayamon River. At the Laguna de Guanica there were no bushes or mangroves, so that the birds frequented reeds and clumps of marsh grass. In all the coast towns a pair or two nest in the plazas, if there are suitable trees. They are very quick and active. The song of these birds, like that of *Dendroica œstiva*, is loud and cheery, and the call note a sharp *chip*. From February to June, which corresponds to the breeding season, the males sing the whole day long. July 8 at Manati a young bird just from the nest was taken, and after this date they were common. The adults apparently remain paired throughout the year, as even the last of August at Cabo Rojo, when they were molting badly, male and female were invariably found together.

Food.—The 63 stomachs collected show nothing but animal matter (100 per cent). These represent the food from January to August, inclusive, in Porto Rico, Vieques, and Culebra Islands.

This species may be listed among the bird enemies of the mole cricket (*Scapteriscus didactylus*), as an adult male collected at the Laguna de Guanica on May 26 contained in its stomach a mandible and other remains of a changa. Other orthopteran remains (7.21 per cent) were present in 14 stomachs. Lantern flies (Fulgoridæ), present in this species again in large numbers (17.6 per cent), were detected in 28 stomachs. Other Homoptera (7.24 per cent) were largely cicadas (*Proarno hilaris*). Other bugs, partly predacious, though two stinkbugs and a few bug eggs are included, amount to 3.03 per cent. Longicorn beetles (2.7 per cent) were present in 5 stomachs, while small leaf-beetles (1.88 per cent) were taken 12 times. Two species of flea beetles (*Systena basalis* and *Chætocnema* sp.) were each taken by two birds. Small beetles of this group are found to be injurious almost invariably to some of the vegetables grown in fields and gardens. Click beetles (4.96 per cent) were great favorites in the mangrove swamps, and among the weevils (1.21 per cent) may be mentioned a shot-hole stalk-borer (*Xyleborus* sp.). Fireflies come to 1.99 per cent and miscellaneous Coleoptera to 1.88 per cent.

Diptera (8.16 per cent) were present in 16 stomachs, in one case a flesh fly (*Compsomyia macellaria*) that deposits its eggs in sores or injuries in the flesh of living animals, or even in the nostrils of man. The larvæ, known as screw worms, are much dreaded, especially in tropical countries, as in many cases their attack is known to be fatal. That this bird is active in the pursuit of insects is attested by the fact that moths were eaten by 18 birds, and these with caterpillars taken by 9 birds amount to 11.95 per cent. Ants make up 0.58 per cent and other Hymenoptera 8.72 per cent. These last were contained in 26 stomachs and were largely small insects of parasitic habits. A species of *Kapala*, which infests ants, was taken once and indeterminate chalcids were noted three times. A peculiar sawfly, with two-branched antennæ, was found in one stomach. Spiders (18.07 per cent) were eaten constantly and appear in 31 stomachs. Two dragon flies and two earwigs with a small portion of miscellaneous matter form the remainder (2.57 per cent).

In the foregoing outline of the food of this bird it will be seen that approximately 28 per cent of the bulk is made up of insects of a more or less beneficial nature, as spiders, parasitic Hymenoptera, dragon flies, and some bugs. Against these, however, stand the 70 per cent and more of other insects consumed, practically all of harmful species. Among these are some great pests, the lantern flies, nearly all of the beetles, Lepidoptera, and others. Thus the yellow warbler is one of man's friends.

The following insects were identified in these stomachs:

ORTHOPTERA.	
Scapteriscus didactylus	1
HEMIPTERA.	
Ormenis sp.	11
Proarno hilaris	3
COLEOPTERA.	
Scymnus roseicollis	1
Cryptorhopalum sp.	1
Monocrepidius sp.	8
Photinus vittatus	3
Photinus glaucus	2
Leptostylus sp.	2

COLEOPTERA—continued.	
Cryptocephalus sp.	8
Myochrous sp.	1
Systena basalis	2
Chætocnema sp.	2
Mordellistena sp.	1
Xyleborus sp.	1
DIPTERA.	
Compsomyia macellaria	1
HYMENOPTERA.	
Kapala sp.	1

NORTHERN PARULA WARBLER. *Compsothlypis americana usneæ* Brewster.
Reinita, Pecho de Oro.

The parula warbler was the most common of the migrant warblers in Porto Rico. It is found everywhere in forest growth, and occurs frequently in mango trees in pastures. In the forest it is the noisiest of the birds that gather to scold an intruder, and is always active, working quickly through the limbs or catching insects on the wing. Bowdish (1902–3, p. 18) records the first fall birds October 25, 1901, and November 5, 1900, and in 1912 the last were observed near Salinas April 30. One was observed March 8 at 3,000 feet elevation on El Yunque. Migratory movement was apparent among them by February 14, and after this the birds were very restless, especially during early morning, and there was a tendency to work from east to west. In March and April there were distinct waves of migration.

Food.—In studying the food of the parula warbler 61 stomachs from Porto Rico were examined, representing the months from December to May, inclusive, and all parts of the region under discussion. Animal matter amounts to 97.7 and vegetable to 2.3 per cent. The vegetable matter consisted of seeds of small berries of the camacey (*Miconia prasina*) and others and was found in five stomachs collected in December, January, and February.

The animal food is of much more importance and includes a large number of insect pests. Lantern flies (Fulgoridæ) (19.09 per cent) were identified in 29 stomachs. These with other homopteran remains (6.85 per cent), partly of the same family and partly from closely allied groups, all of which are harmful, show that a little more than one-fourth of the entire food is composed of these pests. Other bugs (3.69 per cent) comprise small numbers of leaf bugs, species of the chinch bug family, stinkbugs, and a few predacious assassin bugs. The birds are fond of beetles, and this order supplies 22.53 per cent of the food, nearly all being injurious species. Ladybird beetles (1.36 per cent) were present in 14 stomachs. Longicorn beetles (1.68 per cent) were taken 11 times, and leaf beetles of several species (7.95 per cent) were eaten by 30 of these birds. The major portion belong to the abundant genus *Cryptocephalus*, and several species are represented. Darkling beetles figure as 1.01 per cent and skin beetles 0.45 per cent. Scarred-snout weevils were eaten by eight birds, and among these the coffee leaf-weevil (2.02 per cent) was taken three times at least. Other weevils (2.57 per cent) include two shot-hole stalk-borers, several curculios, and others. Miscellaneous beetle remains make up 5.49 per cent.

Ants (0.17 per cent) were eaten five times, while other Hymenoptera, all small species, come to 3.57 per cent. Flies were captured by five birds and amount to 1.19 per cent. In 18 stomachs were caterpillars, sometimes mere fragments of skin, and in four others occurred moths. These together comprise 10.44 per cent of the total food. Fragments of spiders (29.53 per cent) were identified in 29 stomachs. A small portion of miscellaneous animal matter amounts to 0.26 per cent.

From the tabulated data as presented above the beneficial insects, counting the large number of spiders, amount to practically 35 per cent, and harmful species form the rest of the bulk exclusive of the small percentage of vegetable matter. The bird is thus seen to be a beneficial species. In winter it is the most abundant of the warbler family on the island and frequents localities where it can do much good; so that while not resident, it is one of the most valuable of the regular migrants.

A list of identified material taken from these stomachs follows:

HEMIPTERA.	
Ormenis sp	2
Tettigonia sp	1
Lecanium sp	3

COLEOPTERA.	
Olibrus sp	6
Scymnus roseicollis	5
Scymnillus sp	8
Hyperaspis apicalis	2
Litargus sp	1
Cryptorhopalum sp	5
Photinus sp	3
Photinus vittatus	1
Ptinus sp	1
Leptostylus sp	7
Cryptocephalus sp	20
Cryptocephalus pusio	9
Chlamys sp	2

COLEOPTERA—continued.	
Myochrous sp	1
Ceratoma denticornis	1
Chætocnema sp	4
Zabrotes sp	1
Helops sp	1
Lachnopus sp	3
Euscepes porcellus	1
Pseudomus sp	1
Platypus sp	2
Xyleborus sp	2

HYMENOPTERA.	
Wasmannia auropunctata	1

ARACHNIDA.	
Tetragnatha sp	1
Argyrodes sp	1

BLACK AND WHITE WARBLER. *Mniotilta varia* (Linnæus).
REINITA, GUSANERO, TREPADORA.

The black and white warbler is a winter visitant to Porto Rico, Vieques, and Culebra Islands. The species was common the middle of December, though apparently migration was still going on, and the last bird for the spring was noted at Salinas April 30. This species frequents all forest growth and shade trees about houses, creeping up and down tree trunks and working through the limbs after insects.

Food.—In 11 stomachs which were critically examined animal matter amounts to 100 per cent. The months from December to April, with the exception of February, are represented in this small series. Earwigs were eaten by five birds and come to 8.5 per cent. Orthoptera are represented in four cases and make up 27.06 per cent. Walking sticks were taken twice and a grasshopper once. Lantern flies, found in three birds, amount to 8 per cent, and other bug remains to 0.75 per cent. Beetles form the largest portion of the food and are found in larger or smaller quantities in all the stomachs examined. Longicorn beetles come to 5.61 per cent, leaf beetles to 1.06 per cent, and darkling beetles to 1.37 per cent. Scarred-snout weevils were eaten by three birds and amount to 8.17 per cent, while other weevil remains were encountered in eight stomachs and total 19.58 per cent. Engraver beetles (*Platypus* sp.) were taken by this species, as well as by others previously mentioned. Other beetle remains come to 4.92 per cent. Lepidoptera (5.63 per cent) are represented by two moths, a caterpillar, and a pupa. Hymenoptera were taken in small numbers by two birds, but only comprise 0.56 per cent of the total. Spiders form 8.79 per cent.

The black and white warbler is thus a useful species. The large number of weevils destroyed by the few examined is noteworthy, as are the percentages denoting the quantities of Orthoptera, lantern flies, and miscellaneous beetles eaten.

The following were identified in these stomachs:

HEMIPTERA.	
Ormenis sp	1

COLEOPTERA.	
Endeitoma granulata	1
Aulonium bidentatum	1
Leptostylus sp	1

COLEOPTERA—continued.	
Lema sp	1
Cryptocephalus sp	1
Metachroma sp	1
Platydema virens	1
Helops sp	1
Euscepes porcellus	3
Platypus sp	3

PORTO RICAN BANANAQUIT, PORTO RICAN HONEY CREEPER. *Cœreba portoricensis* (Bryant).
REINITA, REINA, GUSANERO.

The honey creeper was a common resident in all the localities visited. In Porto Rico it is without question the most abundant bird, being found everywhere in the mangroves lining lagoons and bays, along maya hedges, through the cane fields, in mango trees in the pastures, in coffee plantations, thickets, and small forests, seemingly being able to adapt itself to all conditions. It is the only bird common in the dense, humid forests clothing the higher slopes of El Yunque, and the species is equally common on the dry south coast, where rains are infrequent. Honey creepers are very quick and active, and when resting for an instant flit the wings rapidly with a kingletlike motion. In the maya hedges they work quickly along, going out frequently into the cane fields. It is one of the few birds common in coffee plantations, far outnumbering all the other species found there. These creepers are very tame and trusting, coming about houses, searching the eaves for spiders, and even entering open doors and windows. In the little cafetins in the barrios it is a common practice to place sirup on the counter for them, and a pair will visit this supply daily.

The song of this bird is incessant and is an insectlike trill that may be likened to the syllables *zee-e-e-e swees se tee*, the first part given slowly in a thin, high tone and the last more rapidly. In the dark forests of El Yunque this was the only song heard. Nothing appears to daunt them. Near Adjuntas, after a cloudburst, where the torrents of rain were accompanied by violent, shifting winds, the honey creepers were singing cheerfully the instant the heaviest part of the downpour was over. The young begin singing as soon as they are fully feathered and frequently are breeding before they have lost the juvenal plumage, when they can not be more than 6 or 7 months old.

The nesting season extends without break throughout the year, though nests are most abundant from February to June. Several broods are raised; how many can be told only by extended observations of one pair. The nests are common and many are built in exposed localities. They are globular affairs, placed at the tips of limbs in a semipendant fashion, from 5 to 30 feet from the ground, and built of weeds, leaves, and grasses, lined with finer material. The opening is always underneath. Both sexes assist in building, bringing straws and other material and fixing them in place, at first forming merely a rounded mass. Although the male is allowed to assist, he brings material only when the female is absent, as, should she catch him in the nest, he is immediately driven out.

The nests, when empty, are used as sleeping quarters, and these birds sleep late, not coming out in the morning until half an hour after other birds have become active. The usual number of young is two or three. The nests of this species should be protected rigidly, as hundreds of eggs are now destroyed wantonly by boys.

All the flowering plants are searched by honey creepers in their quest for food. The molinillo (*Leonotis* sp.) was perhaps visited most frequently, the birds clinging to the rounded flower heads and probing each one in turn. The muñeco (*Cordia collococca*) and bucare (*Erythrina* sp.) also, when in blossom, proved a great attraction. The flowers of the banana contain much nectar, and these are visited often. The birds are said occasionally to pierce ripe bananas, but as the bunches are usually cut while green, the damage is negligible. One taken near Cayey January 17, 1912, had the throat filled with pulp of red raspberries (*Rubus rosifolius*), and it was not unusual to find clear nectar in the esophagus. Near Rio Piedras one visited a ripe guanabano (*Anona muricata*) that had been torn open by a spindalis, and ate for nearly five minutes, hanging head down from a twig above and pulling and nibbling at the inside of the fruit. Other undamaged fruit in the same tree was not touched even after the one that was already open was removed. There is some complaint among fruit growers that this species pricks and destroys oranges but though much time was spent in the groves nothing of this kind was seen, the nearest approach to it being when fully ripe fruit had been opened by other agents, then the honey creepers visited it for the juice. Those seen in citrus groves were invariably feeding on insects.

Food.—Because of the complaints made by many people against these birds much time was devoted to watching them, and a considerable number were collected. One hundred and forty-nine stomachs were examined, and in these animal matter amounted to 97.56 per cent and vegetable to 2.44 per cent. These birds were collected on Porto Rico, Vieques, and Culebra, in the months from December to August, inclusive. The vegetable matter consisted of seeds in six stomachs (in one case of *Chenopodium* sp.) and of vegetable fiber in three others, so that in no case did it have any particular significance. The stomach itself is very small in proportion to the size of the bird, appearing merely as a knot at the juncture of the esophagus and intestine. The birds undoubtedly feed to a great extent upon nectar and other sweets, but just how large a portion of their nutriment is secured from this source can not be determined. However, each stomach, small as it was, was usually filled with animal matter, and from it can be determined the economic status of the species. Lantern flies (Fulgoridæ) appeared in 33 instances and amount to 14.52 per cent. In two cases they form the entire bulk of the stomach contents, and large percentages occur in several. Only one other bug was identified in this series of stomachs. Leaf beetles, among which were several flea beetles, amount to 2.11 per cent, and longicorn beetles to 0.35 per cent. Ladybird beetles were found in 10 stomachs and constitute 1.87 per cent. They were the only beneficial beetles eaten. Weevils are well represented, coffee leaf-weevils, found 10 times, coming to 1.79 per cent. Curculios and billbugs comprise 0.8 per cent, engraver beetles 1.55 per cent, and a few miscellaneous weevils 0.47 per cent. Beetle remains other than those mentioned above figure as 2.89 per cent.

In no less than 96 stomachs were bits of caterpillars, while one other contained a pupa and a moth. These form 37.56 per cent, the largest item in the food of the bird. Nearly all the caterpillars were small and very young. They form much of the food through all of the months represented, the maximum, 46.42 per cent, being contained in a collection of 36 stomachs secured in March. Remains of flies were encountered in 13 stomachs and come to 1.26 per cent. and ants in 17 birds amount to 1.28 per cent. Bits of other Hymentoptera (4.65 per cent) were found in 16 stomachs. They come mainly from the small parasitic groups, though a few from other families are represented. Spiders, nearly all young ones, and therefore indeterminate as to genus and species, were eaten by 82 of these birds and a pseudoscorpion by one. These comprise 25.89 per cent of the bulk. Miscellaneous matter (0.58 per cent) includes a snail and some insect eggs. An interesting result in these examinations was the finding in three stomachs of Thysanoptera, which were in two instances definitely identified (*Ommatothrips* n. sp.). These are insects of great economic importance in many cases, and birds eating them perform good service. They are so small and so fragile that they would be rapidly digested and eliminated from a stomach.

One-third of the food of the honey creeper, as shown in the discussion above, is composed of beneficial insects, more than 25 per cent being spiders, some of which may be of doubtful value. Passing over the 2.44 per cent of vegetable matter, the remainder is composed entirely of harmful species. Lantern flies injurious to nearly all kinds of vegetation, several kinds of weevils, and large numbers of caterpillars are eaten greedily, while ants, flies, and thrips are taken in less number. The list includes many serious pests, against the attacks of which the agriculturist must guard, and in destroying them the bird is performing excellent service. Reports of the destructiveness of the honey creeper to oranges seem unsubstantiated, but if individuals form this habit they should be destroyed. Otherwise the species should be protected and encouraged in all localities. The following were identified in these stomachs:

THYSANOPTERA.	
Ommatothrips n. sp	2
HEMIPTERA.	
Ormenis sp	7
COLEOPTERA.	
Scymnus roseicollis	1
Scymnillus sp	5
Leptostylus sp	3
Lema sp	1
COLEOPTERA—continued.	
Physimerus sp	2
Cryptocephalus sp	1
Myochrous sp	1
Lachnopus sp	10
Euscepes porcellus	1
Phyllotrox sp	2
Caulophilus sp	1
Caulophilus latinasus	1
Platypus sp	3
Xyleborus sp	2
Xyleborus inermis	1

HOODED WEAVER FINCH. *Spermestes cucullata* (Swainson).
DIABLITO, CHUPADOR DE ARROZ, GORRION.

The hooded weaver finch, an African species, has become naturalized in Porto Rico, and is a common resident up to an altitude of 600 feet. Above that it was noted only at Cayey (1,275 feet) and Adjuntas (1,550 feet). It was evidently introduced many years ago, as Bryant (1866, p. 254) mentions that several specimens were taken on the island in the sixties. This species is usually found in small flocks of from 10 to 25 and frequents open banks of streams, borders of fields, and grass-grown pastures where food is abundant. Near Cabo Rojo they were very common, and flocks of several hundred were encountered. On the ground these tiny birds feed close together, clustering on the ripening heads of malojillo (*Panicum* sp.), busily eating. When flushed they rise in a close flock with low churring notes, and fly only a short distance to a tree, where the whole flock divides into twos and threes, the birds sidling along the limbs until they are as close together as possible.. Near Cabo Rojo in August the young gathered in large flocks, and were evidently roosting at night in dense mango trees.

In May they divide into pairs and breed. A nest found near Yabucoa May 10 was built in a small tree on a steep slope, where the structure was visible from all sides. It was located about 6 feet from the ground, and was built of grass stems 8 or 10 inches long and well thatched in, but with the ends projecting crisscross in every direction. The top was arched over, but the nest had a very untidy appearance. It contained one young bird about 3 days old, and three eggs on the point of hatching. The eggs were opaque white and in shape were elongate elliptical.

Near Cabo Rojo the last of August these birds were preparing to raise a second brood, as the first were old enough to care for themselves. At Comerio they were feeding in seed-tobacco fields, where all the seed heads had not been collected, but unless very abundant they would not do damage.

Food.—In January, February, May, July, and August, 33 stomachs of this little weaver finch were collected, and with many of them the gullet was preserved also, as it was usually distended with seeds. The only animal matter in these was the elytron of a rove beetle. Large quantities of sand were found in all, and in a few were bits of snail shell, unquestionably picked up as an aid to digestion. Seeds of various grasses and a few of sedge constitute the entire contents. These are nearly always shelled before swallowing and in the gizzard are soon ground up and digested. In eating these grass seeds the birds can be accused of no damage, though formerly they were said to injure rice when it was still soft. For their ordinary food, however, they prefer smaller seeds than rice, and as rice is little cultivated now because of the ravages of the changa this weaver finch seems to be a neutral species, though it destroys numbers of crab grass seeds. At times it may feed on seeds desired for planting, and then should be discouraged. A list of seeds eaten follows:

Crab grass (*Syntherisma sanguinalis*)	5	Panic grass (*Panicum* sp.)	2
Ichnanthus (*Ichnanthus pallens*)	6	Malojillo (*Panicum fasciculatum*)	17
Egyptian grass (*Dactyloctenium ægypticum*)	3	Paspalum (*Paspalum* sp.)	3
Smut grass (*Sporobolus indicus*)	6	Paspalum (*Paspalum millegrama*)	20
		Fimbristylis (*Fimbristylis* sp.)	1

SCARLET-CHEEKED WEAVER FINCH. *Amandava melpoda* (Vieillot).

VETERANO, BENGALI, GORRION.

Another African species that has been introduced and naturalized in Porto Rico is the scarlet-cheeked weaver finch. Gundlach (1878, p. 206) found them abundant in 1874, and is the first to mention them. They are now found in the coastal regions from Mayagüez to Yauco, which is practically the range given by Gundlach 35 years ago, except that he recorded them north to Añasco. They were seen at Yauco May 16 to 28; Cabo Rojo, August 24 to 31; and at Mayagüez, June 6. The northern half of their range is very humid, while at Yauco and below Cabo Rojo it is equally dry. These birds frequent marshy growths and dense thorny thickets of rallo (*Vachellia* sp.), an acacia, and cane fields. They are spirited little birds with quick, nervous movements and when alarmed call continually. On the wing the long tail and short wings give them a quick, tilting flight, and they seldom fly far. When feeding they spread out somewhat, but when excited all bunch up, peering through the limbs, and then move away, keeping well under cover. In the middle of the day they feed on the ground, in patches of shade under bushes. In the cane fields they flush with quick calls, fly a few yards, and then drop back out of sight.

The ordinary call note is a low *tsee tsee tsee* and a low chattering call. Near Cabo Rojo, August 30, one female was seen feeding nearly grown young, regurgitating softened grass seeds from her throat to give to them. Bowdish (1902–3, p. 13) notes breeding birds taken May 23 and 30, presumably from Mayagüez.

Food.—In 19 stomachs of this odd exotic, collected at Yauco in May and Cabo Rojo in August, I found vegetable food only, with small percentages of sand as an aid in digestion. Grass seeds of several species furnished the bulk of the food and were nearly always neatly shelled. A few amaranth seeds were found, and these were swallowed entire, the smooth hard surface of the seed not permitting them to be readily split open, though the three-sided seeds of a sedge (*Carex* sp.) were neatly divested of their covering. Two immature birds had swallowed large quantities of grass seeds without hulling them, and occasionally adults ate small seeds in this condition.

These weaver finches destroy small numbers of seeds of noxious weeds, though they prefer panic grass, but as they take no insects they are of little economic importance.

The following list shows the seeds fed upon:

Crab grass (*Syntherisma sanguinalis*)	5	Paspalum (*Paspalum millegrama*)	5
Smut grass (*Sporobolus indicus*)	5	Sedge (*Carex* sp.)	1
Ichnanthus (*Ichnanthus pallens*)	3	Amaranth (*Amaranthus* sp.)	5
Malojillo (*Panicum fasciculatum*)	6		

BOBOLINK. *Dolichonyx oryzivorus* (Linnæus).
CHAMBERGO.

The bobolink is a rare migrant. Pelzeln (1871, p. 199, footnote) says that a specimen received from the Paris Museum is marked Porto Rico, and Gundlach[1] says that it has been taken on Vieques Island, where previously recorded by Cory (1892, p. 110).

YELLOW-SHOULDERED BLACKBIRD. *Agelaius xanthomus* (Sclater).
MARIQUITA, CAPITAN.

The yellow-shouldered blackbird is a common resident in Porto Rico. There appear to be a few of these birds on Mona Island, as Bowdish (1902–3, p. 12) recorded one, and Cory (1892a, p. 229) received two collected by W. W. Brown, jr., in February and March, 1892. In Porto Rico the species is found mainly below an altitude of 800 feet, and is most abundant in the coastal region, following inland along the open valleys of the larger streams. Lares (1,200 feet) was the highest point at which they were observed, none being seen in the high central mountain range. In fall, winter, and spring this species moves over the country in small flocks, returning at nightfall to some clump of trees or mangroves to roost, so that it is common to see them flying back and forth morning and evening. The flight at such times is direct, though undulating, and an occasional flash of yellow shows on the wing. In the mangrove swamps a small party frequently feeds in close array on the wet ground, or single individuals clamber through the branches absorbed in their search for food. Often they are seen climbing actively up and down the long fronds of the coconut palms, in oriole fashion, or walking sedately among the cattle in pastures.

The common call note is a sharp *chick* that is indistinguishable from that of the Porto Rican oriole, and a low *chuck* is often heard. About the nests they have the sharp, staccato, scolding notes of the red-winged blackbird of the North, given as they circle and wheel overhead. The males do not sing a great deal, though odd, wheezy, or reedlike notes, resembling those of the yellow-headed blackbird, are sometimes heard.

The breeding season is in May and June, sometimes as early as March, and the young are usually out of the nest by the end of June. The nests of this species appear always to be built in coconut or royal palms, the birds nesting, as a rule, in small colonies or sometimes in pairs. When the nest is in a royal palm, the male spends most of his time on the tall projecting spike in the crown, where he postures with drooping wings and spread tail, but sings very little. When alarmed, the female flies up and clings to the side of the spike, just below him, both scolding vigorously. All the nests observed were in the axils of the long leaves. The birds feed near the nest, walking about on the ground, and sometimes wading in shallow water. As soon as the young leave the nest, all gather in small flocks, at first remaining near the nesting colony, but as they get stronger on the wing going farther afield. At this season they avoid the intense midday heat by frequenting coffee plantations, clumps of bamboo, and shaded perches.

In mixed flocks with the Porto Rican grackle, this species feeds in newly plowed fields and in cane fields while the growth is small, following the plow for the grubs and insects exposed. In this way they do much good. Around Manati large flocks of old and young frequent the citrus groves, feeding on the ground and flying up to perch in close flocks in the trees, the dead limbs being preferred. In spring, with the other blackbirds, they frequent the bucare trees (*Erythrina* sp.), probing the handsome blossoms for their nectar.

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[1] Ornithologia Cubana, 1893, p. 118.

Food.—From January to July, inclusive, 55 stomachs of this bird were collected and later examined in the laboratory. In the primary allotment animal food amounted to 90.1 per cent and vegetable to 9.9 per cent for the period under consideration. Weevils, other beetles, cutworms, and caterpillars comprise by far the greater bulk of the animal matter, while of the vegetable food a little more than half is composed of corn.

Animal food.—Feeding upon the ground, as other blackbirds do, and in the trees, as its relatives the orioles do, a wide range of animal food is secured by this bird. Orthopterous remains (1.95 per cent) in six birds are formed largely of grasshopper eggs and the oöthecæ of roaches, though remains of adults were found. Earwigs (Forficulidæ) (1.37 per cent) secured in searching oriolelike through the branches of trees were eaten by five birds. Homopterous remains (5.7 per cent) are composed of tree hoppers and lantern flies, with bits of a cicada. Other bug remains (3.36 per cent) are of predatory species in part at least. Leaf beetles constitute only 1.69 per cent, though present in 18 instances. Flea beetles and tortoise beetles were represented, though the larger number were unknown species of the genus *Cryptocephalus.* The cane root-boring weevil (*Diaprepes spengleri*) was eaten nine times and amounts to 1.72 per cent. Other scarred-snout beetles to which family this pest belongs comprise 10.15 per cent and were found in 16 of the gizzards. Among them were several coffee leaf-weevils (*Lachnopus* sp.). Curculios total 2.13 per cent and other weevil remains 1.92 per cent, so that weevils as a whole constitute nearly one-sixth of the entire food. Cerambycidæ (0.81 per cent) were taken in small quantities, and miscellaneous Coleoptera figure as 16.79 per cent.

Caterpillars were found in 30 stomachs, lepidopterous pupæ in 3, and a moth in 1, all forming 28.32 per cent. A large part of those first enumerated were cutworms, picked up in cultivated fields. The greatest quantities were eaten in January and February. The remains of Hymenoptera (1.03 per cent) include a number of ants and a wasp, as well as some unidentified fragments. Diptera (3.65 per cent) were taken sporadically, the largest number being secured in January. Spiders eaten by 13 birds amount to 7.83 per cent, snails found in eight instances figure as 1.56 per cent, while miscellaneous animal matter forms 0.43 per cent. A list of identified species follows:

HEMIPTERA.	
Proarno hilaris	1
Phymata sp	1

COLEOPTERA.	
Monocrepidius bifoveatus	1
Photinus glaucus	3
Eburia sp	1

COLEOPTERA—continued.	
Cryptocephalus sp	18
Systena basalis	2
Coptocycla signifera	1
Anthicus floralis	1
Diaprepes spengleri	9
Lachnopus sp	6
Euscepes porcellus	1
Metamasius hemipterus	1

Vegetable food.—More than one-half (5.73 per cent) of the vegetable food is composed of corn taken entirely in May and June. For June it totals 36.87 per cent and was present in 10 of the 15 stomachs examined for that month. In May only 2 birds in 18 had taken any. In June flocks of these birds were feeding in ripening fields of corn near Lares. The adults were feeding their young out of the nest on the soft kernels taken from the ear. Though the birds were not seen actually eating the grain, the terminal kernels of a small number of ears in each field were missing, and bits of the grain were found in the bills and throats of some of the birds shot. Two birds collected in a cornfield near Ciales on July 17 had not touched the grain.

Other vegetable food consisted of seeds of grass, a few unidentified seeds, 3.71 per cent in all, and a small quantity (0.35 per cent) of vegetable rubbish.

Summary.—Roughly estimated, nine-tenths of the food of the mariquita is levied from the animal kingdom and large numbers of harmful insects are destroyed. Weevils especially are favorites, and comprise several serious pests of sugar cane, coffee, and other crops. Cutworms, too, are much relished, and a host of other forms, among which only spiders may be considered useful, make up the remainder. Of the remaining one-tenth of vegetable matter a little more than half is composed of corn taken from the ear when still in the milk. For the entire year this is a small amount, but during June some damage is done locally, and in such cases the blackbirds should be driven out by shooting or other means. In some instances it was found that the birds, though flocking in cornfields, did not touch the grain, so that before disturbing them there should be evidence of sufficient damage to warrant it. Throughout the season as a whole this blackbird is beneficial, and should be allowed a small toll of grain as part payment for its usefulness. Care should be taken not to mistake the depredations of rats in the cornfields for the work of the blackbirds. Rats are in some cases very destructive to grain in localities frequented by the blackbirds. The blackbird merely pecks open the end of the ear and pulls off the kernels, while the rat gnaws off the husks, dropping a pile of refuse to the ground below and frequently destroying half the ear.

PORTO RICAN ORIOLE. *Icterus portoricensis* (Bryant).

CALANDRA, CALANDRIA.

The oriole is resident on the island of Porto Rico. It is common in the coconut palms near the coast, and inland it frequents coffee plantations and second-growth forests, where, swinging head down, it finds and destroys many caterpillars. It is rather wild at times and keeps well concealed, and again comes into shade trees about the houses. This bird has the most beautiful song of all the Porto Rican species—a clear whistle of several notes, pitched rather high. It sings mainly in the morning and evening, and is one of the few birds heard at daybreak. The ordinary call note is an oriolelike *chick* or *chuck*, and the birds also have a thin, high note like *pe-ee*, resembling the call note of the goldfinch or siskin.

The breeding season extends from the first of May to the middle of July, and after the middle of June young in first plumage are common. The adults begin to molt then. This species breeds while in first-year plumage, and several pied specimens were taken. The only nest located was in a grove of coconut palms north of Manati, on July 8. It swung from the underside of one of the long leaves, and was supported under the center of the rib by four radiating " straps," firmly attached, leaving only a small space between it and the underside of the midrib to serve as an entrance. It appeared to be woven strongly of fibrous materials.

The oriole is very fond of the sweet flower juices of plants and trees, the bucare (*Erythrina* sp.) being visited frequently when in blossom, while the abundant nectar of the banana is a great attraction, several birds visiting a single flower in rapid succession. Near Aibonito the birds were seen eating the pulp and juice of overripe wild sweet oranges (chinas) and had opened half a dozen on one tree. As the fruit in cultivated groves is picked long before it reaches this stage no damage results.

Food.—From January to August, 71 stomachs were collected and on detailed examination these show 99.84 per cent of animal matter. Two birds had secured a little vegetable rubbish and one had eaten the hard flinty seed of a grass (*Olyra latifolia*), which in all amounts to only 0.16 per cent. Earwigs, some of them of large size, were found in 40 stomachs, though often only the curious nipperlike caudal forceps remained after the processes of digestion.

They amount to 24.36 per cent of the total, and as their habits in the Tropics seem little known must be regarded as neutral species. Four of the birds secured in April and May had eaten the mole cricket (*Scapteriscus didactylus*), though in small quantity (0.21 per cent). Other Orthoptera (7.2 per cent) were eaten 18 times and were composed in great part of other crickets, roaches, numbers of roach egg cases, and a few grasshoppers and their eggs. Cicadas, found in nine stomachs, form a considerable share of the bulk (7.56 per cent). Other bug remains, a stinkbug, tree hoppers, and some other fragments, total 1.36 per cent.

Weevils form one-seventh of the entire food, and among them the scarred-snout beetles are the best represented (12.89 per cent). The cane root-borer (*Diaprepes spengleri*) was eaten 3 times, the coffee leaf-weevil 11, and members of this family were identified in 30 stomachs. Curculios come to 0.6 per cent and miscellaneous Rhyncophora to 1.72 per cent. A few leaf beetles were eaten regularly (1.22 per cent) and darkling beetles were taken in small numbers (1.40 per cent). Miscellaneous matter (1.63 per cent) consisted of a scarabæid, a firefly, four click beetles, and a few longicorns and buprestids. Lepidoptera (4.3 per cent) were well represented by caterpillars taken by 16 birds, and a moth and a pupal case in one instance each. Hymenoptera composed of ants, wasps, and wild bees comprise 2.44 per cent, and flies 0.22 per cent. Forty birds had eaten spiders and one a scorpion, which come to 31.67 per cent. Miscellaneous matter, largely vertebrate, amounts to 1.06 per cent. Small tree toads were secured three times and one little lizard was eaten.

With the exception of spiders, which form a little less than one-third of the food, and a few vertebrates, the animals destroyed by the Porto Rican oriole are in the main harmful species. In searching through the trees the bird secures numerous scarred-snout beetles and other weevils, a group which contains some of the most serious pests of the region. Grasshoppers, roaches, crickets, and caterpillars are taken in numbers. The oriole is one of the beneficial birds frequenting coffee plantations and, having abundant shelter and building inaccessible nests, the bird will continue to hold its own.

The following were determined in the stomachs examined:

EUPLEXOPTERA.

Phaulex albipes	1

ORTHOPTERA.

Orocharis sp	1
Anurogryllus muticus	1
Scapteriscus didactylus	4

HEMIPTERA.

Proarno hilaris	3
Lecanium sp	1

COLEOPTERA.

Europs apicalis	1
Photinus glaucus	1
Cryptocephalus sp	3

COLEOPTERA—continued.

Metachroma sp	2
Metachroma lituratum	1
Coptocycla signifera	1
Platydema sp	4
Helops sp	1
Diaprepes spengleri	3
Lachnopus sp	11
Euscepes porcellus	3
Metamasius hemipterus	1

HYMENOPTERA.

Solenopsis geminata	1

VERTEBRATA.

Eleutherodactylus sp	3
Anolis sp	1

TROUPIAL. *Icterus icterus* (Linnæus).
Trupial.

Gundlach (1878, p. 209) notes the troupial, an exotic species, as naturalized near Quebradillas, and says that its food consists of various wild fruits and the seeds of the royal palm. The bird is known to many of the Porto Ricans and at one time must have been fairly common. Now, however, it is very rare if not actually extinct. An oriole seen below Aibonito January 5, was thought to be this species, but identification was not certain. All the reports regarding its occurrence come from the western end of the island. The species is commonly kept as a cage bird, and probably has been introduced in this manner.

PORTO RICAN BLACKBIRD. *Holoquiscalus brachypterus* (Cassin).
MOZAMBIQUE, CHANGO. (PLATES VIII and IX.)

The Porto Rican blackbird is one of the characteristic birds of the island, being found wherever there are cultivated fields. In the lowlands, below 500 feet altitude, it is the most common bird, and above that it occurs in small numbers.

The birds are found ordinarily in small flocks of from 3 or 4 to 25, feeding on the ground in the pastures or cultivated fields. The males strut about, holding the head and tail high, calling squeakily, while the females are more preoccupied searching busily for food. In flight the V-shape of the tail is much exaggerated, the birds seeming almost deformed. In rising this is rather a hindrance to them, and in flying up into a palm they sometimes go beyond the tree and then come back, not being able to rise at a sharp angle. Their favorite perches are the royal and coconut palms, where they spend much time, walking up and down the broad leaf stems or sitting quietly in their shade. The ordinary call note is a gracklelike *chuck* or a thin high *tee tee tee*, and the song may be represented by the syllables *K'see ah—h—h*, rather a wheezy effort, given with the wings spread and the tail deeply V-shaped.

The breeding season extends from the 1st of May until the 10th of July, the birds usually nesting in colonies in royal or coconut palms, though at times an isolated jobo tree (*Spondias lutea*) is chosen. The royal palm is, however, the favorite location. The nests are constructed in the large seed clusters and at the bases of the long leaves, often in close proximity. The birds were continually flying back and forth about the nests calling, singing, and posturing, making a scene of the greatest animation. Nest construction is carried on by the females, though the males always accompany them, strutting about on the ground and driving other intruding males from the chosen nesting site. Incubation, too, falls to the lot of the female, her spouse following her expeditions for food, but when the young are hatched both sexes care for them. After the middle of June the young commonly follow their parents, teasing for food, and when unnoticed protest vigorously. In August these family parties join in small flocks, remaining together until the next year. The flocks feed in the cultivated fields, pastures, or sometimes on the gravel bars of streams, where occasionally they wade in the shallow water, turning over the leaves for aquatic insects or, standing in water up to their bodies, splash and flutter in bathing.

This species is widely recognized as the most beneficial on the island, and fortunately it is also one of the most common. While the cane and tobacco fields are being prepared for planting, flocks of the birds follow the plow, feeding on the insects exposed in the overturned furrows. Even when the cane is well grown they follow the cultivator through the rows. In the breeding season it is common to see three or four fly from the low-lying fields inland into the foothills with a white grub shining in each bill. On the ground they walk rapidly along, peering from side to side and following the working peons closely.

After the breeding season old and young were observed feeding also on wild fruits, among which were the following: Icaco (*Chrysobalanus* sp.), sapalo (*Palicourea riparia*), and moral (*Cordia nitida*). In spring the adults were seen taking the nectar from the bucare (*Erythrina* sp.) and the muñeco (*Cordia collococca*). Frequently birds had the throat full of this honey and the feathers of the head yellow with pollen. The manzanillo (*Hippomane manchinella*) also was eaten to some extent.

Food.—The blackbird or chango is one of the best-known birds of Porto Rico, and its usefulness is almost universally recognized. Some of the current ideas of its food, based on observation alone, are mistaken, but so much good is done in other ways that the chango is entitled to a high place in the class of beneficial species. From December to August, 98 of these birds were collected in all parts of Porto Rico and in Vieques, and the contents of their stomachs later were scrutinized carefully. Animal food formed 93.38 per cent and vegetable 6.62 per cent. Blackbirds everywhere are recognized as almost omnivorous, and this species is no exception to the rule, all living creatures of small size being eaten.

Animal food.—Though commonly considered one of the greatest enemies of the mole cricket (*Scapteriscus didactylus*), remains of this insect were found in only eight of the birds (0.21 per cent), most of them being eaten in July. The changas taken are nearly all nymphs. Remains of other Orthoptera (19.34 per cent) were found in 42 stomachs and comprise adults of grasshoppers, locusts, and crickets, with a few eggs of roaches, walking sticks, and others. Insects of this class are common in the pastures frequented by the blackbird and form an abundant food supply. Bugs of the homopterous group (2.02 per cent) are composed in great part of cicadas (*Proarno hilaris*), with a few lantern flies. Stinkbugs (3.32 per cent) were eaten 17 times, and miscellaneous bug remains come to 1.11 per cent. Adult May beetles (*Lachnosterna* sp.) were found in 2 instances and larval scarabæids—white grubs—in 11, all amounting to 1.42 per cent. In 23 birds collected in May, largely in cane fields under cultivation, these form 9.47 per cent, and it is under such conditions that insects of this group are exposed to attack. Large numbers of the adult cane root-boring weevil were destroyed, this insect being identified in 39 stomachs. For the entire period this weevil amounts to 9.69 per cent, while for the months of April and May the bulk of it came to 26.67 per cent and 32.13 per cent, respectively. Remains of 11 were taken from one gizzard and from 3 to 6 were not unusual. The coffee leaf-weevil (*Lachnopus* sp.) was taken by 23 birds and amounts to 1.61 per cent. And though only 13 birds had eaten the slender-beaked weevil stalk-borer (*Metamasius hemipterus*), it constitutes 5.44 per cent. This weevil was secured in March and in the months from May to August, inclusive. Mixed remains of curculios and other weevils total 1.23 per cent and other beetle remains 1.06 per cent.

Lepidopterous remains (11.15 per cent) figure largely in the food and occur in all the months except April. Thirty-nine birds ate caterpillars and six had captured moths. One stomach contained 16 cutworms as well as 3 adult cane root-boring weevils. Diptera (0.16 per cent) were present in small numbers and Hymenoptera (1.11 per cent) occurred frequently. This group, with only two exceptions, was represented by wasps and considerable numbers of ants, among which fire ants (*Solenopsis geminata*) occurred three times. Spiders were found in 30 gizzards and mites in 1. Two birds had eaten cattle ticks (*Margaropus annulatus*). One of these, taken in a brush-filled pasture on Vieques Island on March 21, contained 35 ticks, and the other from Cabo Rojo, killed on August 31, had eaten 12 ticks, all greatly distended with blood, so that in this case they were undoubtedly picked from some animal. Snails (*Subulina* sp. and *Planorbis* sp.) were eaten regularly and comprise 6.02 per cent of the total. Amphibian remains (5.74 per cent) were encountered in 12 stomachs and were composed of both the common frog and little tree toad. Lizards (16.04 per cent) were found in 34 stomachs. The ameiva was found twice, the other remains being those of small anolis. Miscellaneous animal matter comes to 1 per cent.

A list of identified animal matter follows:

ORTHOPTERA.

Neoconocephalus macropterus	1
Anurogryllus muticus	4
Scapteriscus didactylus	8

HEMIPTERA.

Ormenis sp	1
Proarno hilaris	8
Emesa sp	2
Margarodes formicarum	1
Lecanium sp	1

COLEOPTERA.

Hyperaspis apicalis	1
Monocrepidius bifoveatus	1
Chrysobothris sp	1
Lachnosterna sp	2
Cryptocephalus sp	1
Systena basalis	2
Lachnopus sp	23
Diaprepes spengleri	39
Euscepes porcellus	4
Chalcodermus sp	1
Chalcodermus pupillatus	1
Baris torquatus	1
Metamasius hemipterus	13

LEPIDOPTERA.

Alabama argillacea	2

HYMENOPTERA.

Pheidole sp	1
Pheidole fallax var. *antillensis*	1
Solenopsis geminata	3
Strumigenys rogeri	1

ARACHNIDA.

Margaropus annulatus	2

MOLLUSCA.

Subulina sp	16
Planorbis sp	9

VERTEBRATA.

Leptodactylus sp	2
Leptodactylus albilabris	5
Eleutherodactylus sp	3
Ameiva exul	2
Anolis sp	26

Vegetable food.—Of the 6.62 per cent vegetable matter, 2.19 per cent is composed of corn. This was eaten by 13 of the 98 birds examined and was secured mainly in July, when it amounts to 11.82 per cent. The grain taken was consumed in December, April, and July. Seeds (largely grass seeds) amount to 2.96 per cent and vegetable rubbish comes to 1.45 per cent.

A list of identified species is appended:

Crab grass (*Syntherisma sanguinalis*)	1
Smut grass (*Sporobolus indicus*)	1
Dichromena (*Dichromena ciliata*)	1
Corn (*Zea mays*)	13
Nut rush (*Scleria* sp.)	1
Wild fig (*Ficus* sp.)	2
Amaranth (*Amaranthus* sp.)	1
Purslane (*Portulaca oleracea*)	1
Aji (*Capsicum* sp.)	1
Concombre (*Cucumis* sp.)	1

Summary.—Though the blackbird eats fewer mole crickets than is popularly believed, it consumes such large numbers of weevils, directly injurious to cane and other crops, that it should be classed in the foremost rank of beneficial species. Nearly one-fifth of its food is composed of Orthoptera, and many injurious bugs are destroyed. May beetles and white grubs are eaten voraciously and cutworms are favorites. Two of the birds examined had eaten cattle ticks and the birds were observed searching the cattle for them. Considerable numbers of lizards and amphibians are eaten, and these with the corn consumed form the injurious elements in the food. Most of the grain taken was secured in July, and at least one-third of it was waste grain. However, should the blackbirds gather in large flocks to feed on grain it may be necessary to destroy some of them in order to drive others out. It should be ascertained first that they are doing damage, for they frequent cornfields, as they do the cane, for the shade offered from the heat of the sun. No instance of extensive damage to grain came to my notice, depredations being confined to a few ears, a toll justified by the services of the birds in destroying harmful pests which would do much more injury if unchecked. In general the blackbird is a beneficial bird and the protection accorded it is well placed.

GLOSSY COWBIRD. *Molothrus atronitens* Cabanis.
TORDO.

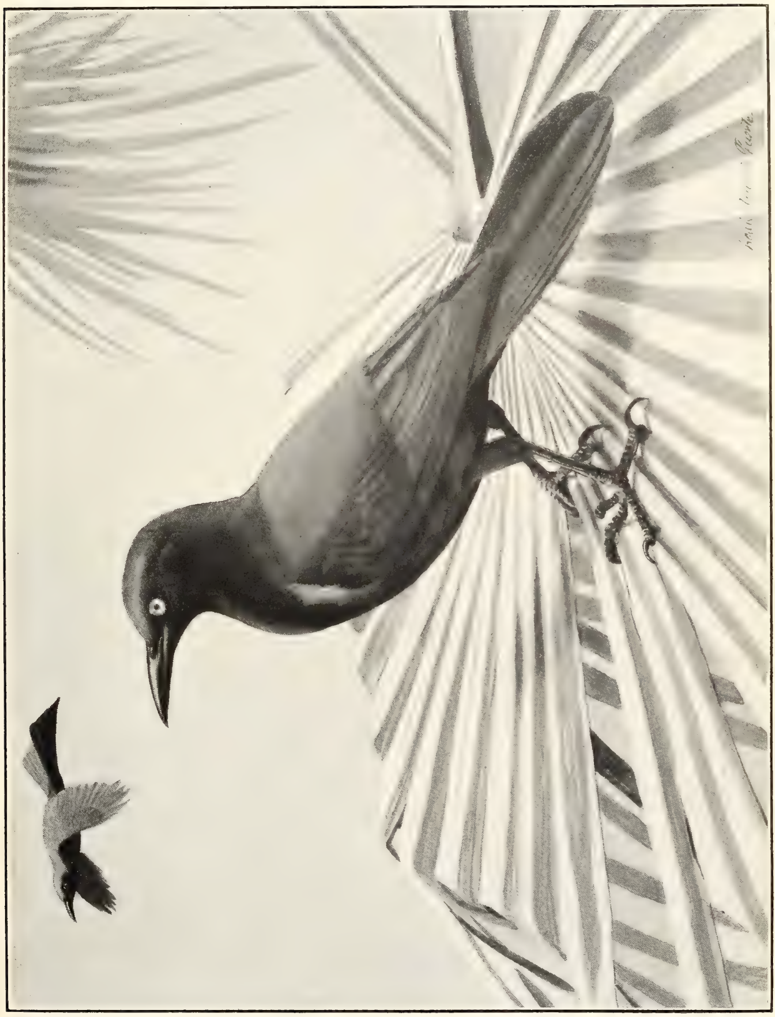
According to Newton (1860, p. 308), a glossy cowbird (given as *M. sericeus*) was taken on Vieques Island by Mr. Riise. It can be regarded only as an accidental visitant.

PORTO RICAN TANAGER. *Nesospingus speculiferus* Lawrence. (PLATE X.)
LLOREN, VERDOSO, VERDEDON DE ESPECULO.

The verdoso was found on the eastern and northern slopes of El Yunque, ranging from the thickets and coffee plantations at an altitude of 700 feet to the dense, dimly lighted forests at the summit of the mountain; and was also common about Maricao, this being the first record for the western end of the island. Until the present time but little has been known of this handsome bird. Although the type is marked as taken by Gundlach, he says (1878, p. 190) that it must have been given him by Blanco in 1868, as he had no recollection of it. Dr. C. W. Richmond collected eight specimens on El Yunque in 1900, but the bird was apparently unknown to other collectors. In the present investigations a fine series of skins was taken and data on habits gathered.

Though in these regions these tanagers were fairly common, they were not easy to secure. In passing along the trails one or two would be heard calling at a distance, or one would appear suddenly in the bushes near by, scolding vigorously, but when silent they were very hard to find. The ordinary call note is a sharp *chewp chewp*, repeated vigorously, while the bird is concealed in a growth of vines or in dense brush. Another note heard less often is a robinlike *tsweep tsweep*. The few natives acquainted with them know them as "the crying birds," from their loud notes, but many living near their haunts knew nothing of them. In March, on El Yunque, they were spread out during the daytime through the brush, many being breeding birds, though occasionally flocks of a dozen or so would appear. At night, however, they gathered in bands to roost. Above the Hacienda Catalina they used three or four royal palms growing near the summit of a ridge. There would be no sign of them until nearly dark, and then suddenly the thickets and patches of gonduros (*Cajanus cajan*) would be alive with the birds coming up the slopes, calling and scolding. From here they flew into the palms, and after much chattering and fighting were settled for the night. Near Maricao, in June, they were breeding, and no flocks were seen. Here they frequented coffee plantations almost exclusively, working actively through the trees above the coffee, fluttering through the twigs, and examining leaves and under sides of limbs, occasionally breaking out with their loud, scolding notes. Several times they were heard singing a sweet warbling song, with many running trills. The flight is strong and undulating, but the birds seldom fly long distances, preferring to hide in the brush. No nests were seen, though the birds were breeding. This tanager will be found perhaps in other scattered localities along the central mountain range of the island. A bird seen near the summit of Mount Pelado above Cayey in January may have been this species.

Food.—In 37 stomachs collected in March on El Yunque and in May and June near Maricao animal food constitutes 59.87 per cent and vegetable 40.13 per cent. In considering the animal matter 8.4 per cent of the total is composed of Orthoptera. One day on El Yunque one of these tanagers picked up a large



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PORTO RICAN BLACKBIRD, OR MOZAMBIQUE (HOLOQUISCALUS BRACHYPTERUS).

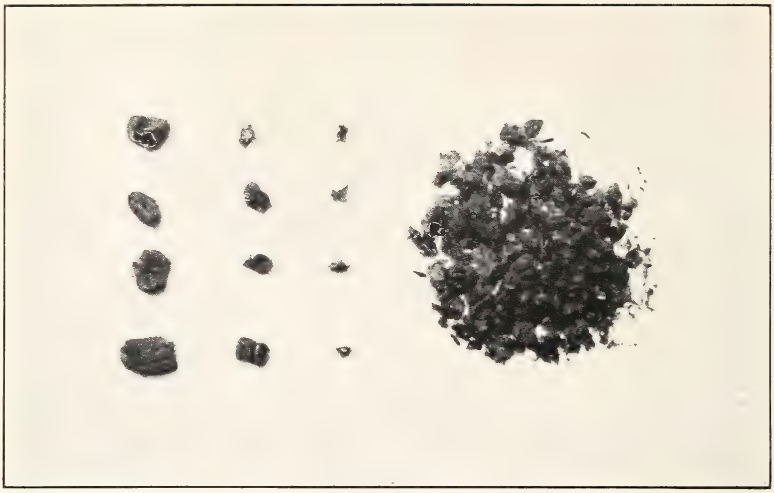


FIG. 1.—REMAINS OF CATTLE TICKS (MARGAROPUS ANNULATUS).

Twelve cattle ticks, besides other miscellaneous food, were found in the stomach of one bird.

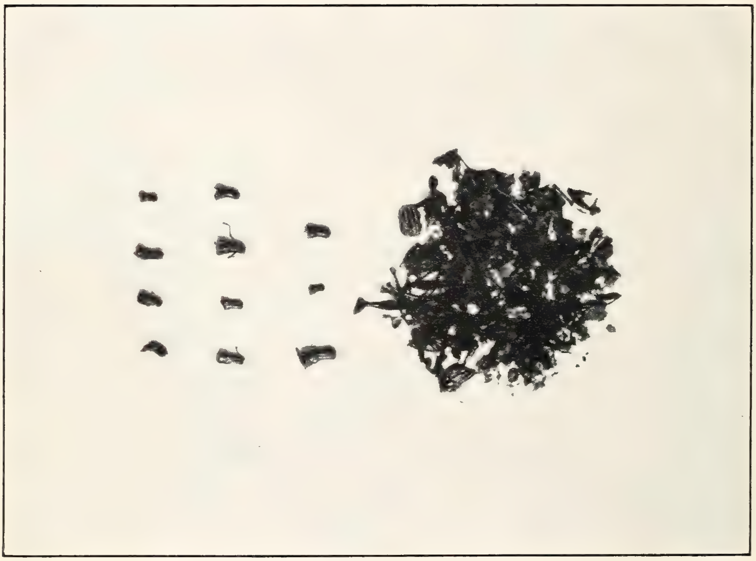
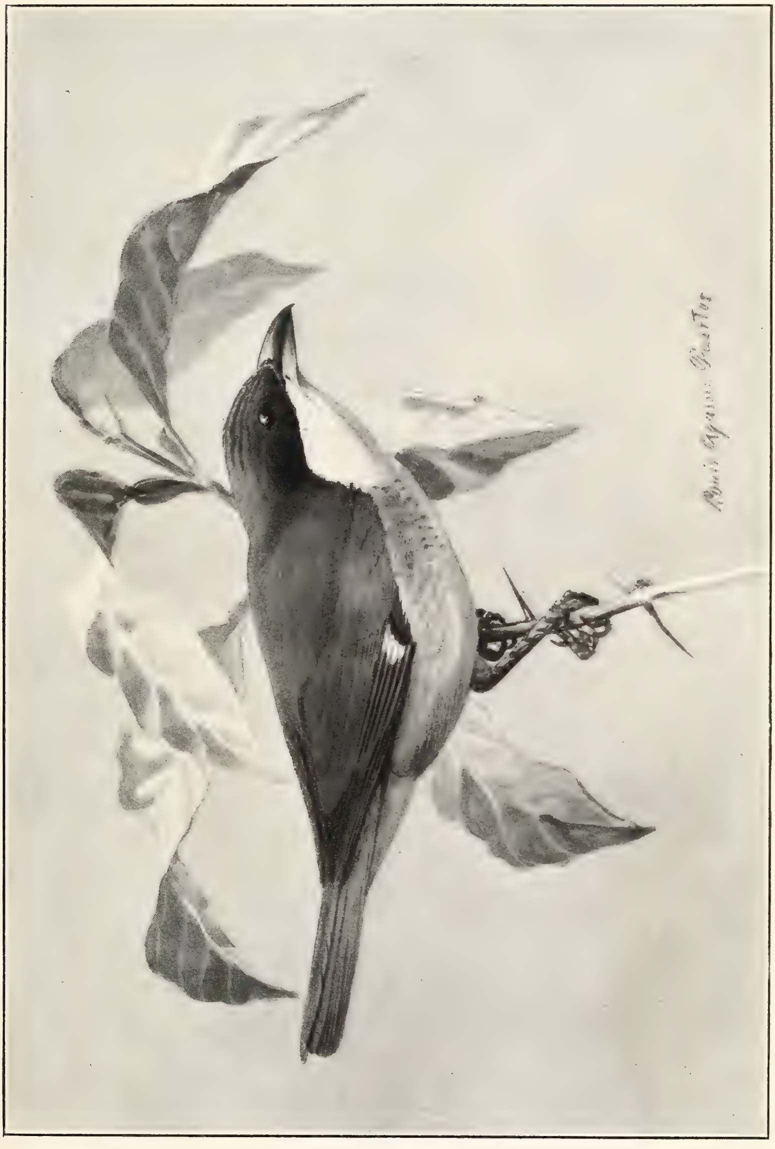


FIG. 2.—REMAINS OF CANE ROOT-BORING WEEVILS (DIAPREPES SPENGLERI).

Snouts of 11 cane root-boring weevils were found in another stomach, in addition to other miscellaneous food.

STOMACH CONTENTS OF PORTO RICAN BLACKBIRD, OR MOZAMBIQUE (HOLOQUISCALUS BRACHYPTERUS).


Louis Agassiz Fuertes

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PORTO RICAN TANAGER, OR VERDOSO (NESOSPINGUS SPECULIFERUS).

green grasshopper in a trail ahead of me and proceeded to break it up on a limb and eat it as I watched. The coffee leaf-weevil (*Lachnopus* sp.), found in 17 stomachs, constituted 8.5 per cent, while other weevils (0.21 per cent) and various beetles (0.35 per cent) were eaten to some extent. Bug remains in three instances amount to 1.26 per cent.

Moths in 2 stomachs and caterpillars in 21 formed a large bulk (30.94 per cent), more than half the animal food. Remains of Hymenoptera, largely fragments of ants, come to 1.72 per cent, and spiders in six instances constitute 1.49 per cent. Snails (0.72 per cent) were eaten twice, and vertebrate matter (tree toads and a small lizard) comes to 6.12 per cent. Miscellaneous matter figures as 0.61 per cent.

A list of identified material follows:

HEMIPTERA.	
Lecanium sp	1
COLEOPTERA.	
Cryptocephalus sp	1
Europs apicalis	1
Lachnopus sp	17

VERTEBRATA.	
Eleutherodactylus sp	2
Anolis sp	1

Vegetable food.—The larger portion of the vegetable food consumed by this bird may be classed as wild fruits (25.7 per cent). Berries of various rubiaceous plants were represented most commonly, many being unidentified. Although no sand was eaten to aid digestion, a number of stomachs contained grass seeds and other species with little or no pulpy exterior, which amount to 8.27 per cent, while miscellaneous matter classed as rubbish comes to 6.16 per cent.

The following were identified:

Paspalum (*Paspalum millegrama*)	4	Camacey (*Miconia prasina*)	3
Paspalum (*Paspalum* sp.)	2	Adelia (*Adelia* sp.)	1
Panic grass (*Panicum* sp.)	2	Capitana (*Phoradendron latifolium*)	1
Palmo (*Acrista* sp.)	3	Sapalo (*Palicourea crocea*)	3
Wild fig (*Ficus* sp.)	2	Rabo de raton (*Gonzaliguinia spicata*)	2
Camacey (*Miconia* sp.)	1		

Summary.—The verdoso is almost entirely a beneficial species, and one of considerable value in the coffee plantations which it frequents. Nearly two-thirds of the animal food is made up of weevils and caterpillars, all serious pests, and the only evil chargeable to the bird is the destruction of a small number of spiders and also of a few lizards and batrachians. Its vegetable food has no value whatever.

The species seems confined to the immediate vicinity of considerable bodies of natural forest, and as at present it has seemingly few enemies, it will perhaps not spread to any extent under protection. In any event, the bird should be encouraged.

PORTO RICAN SPINDALIS. *Spindalis portoricensis* (Bryant).

REINA MORA, TOMATE, LLOROSA, REINONA, LLORONA.

The spindalis is common in Porto Rico, but does not occur in the smaller islands. It is found over the entire island, but comparatively few are encountered in the lowlands, it being most abundant in the hills and mountains. It frequents the patches of second-growth forest, the borders of coffee plantations, hedges, and occasionally citrus groves. The birds are unsuspicious when they alight near one, and peer out of the leaves curiously, but at a distance it is useless to follow them, as they take alarm instantly. Where food is abundant they are found in flocks in sheltered spots out of the wind. The flight is strong and undulating, the birds sweeping along in graceful curves, alighting for a minute or two, and then passing on, so that in feeding they cover considerable ground. The call note is a faint *tseet*, while the males have a low chattering note. This species has apparently no song. The breeding season extends from the end of January to the middle of June, and occasional pairs breed during the rest of the year. The young are very common during June and July.

The food of the spindalis is almost entirely vegetable, and the bird is, without doubt, the greatest disseminator of seeds in the island. Roving in habit, it covers considerable territory, appearing wherever there is food to satisfy its voracious appetite and then passing on. That it does not always confine its attacks to fruit and seeds appears from the fact that, on at least two occasions, it was seen stripping climbing vines (*Ipomea* sp.) of their tender green leaves and eating them. At Rio Piedras the 1st of January two came into a guanabano tree (*Anona muricata*), and in less than half an hour had almost entirely consumed two of the fruits, though the skin was rough and prickly and they were 10 inches long and 5 in diameter. On January 24, near Cayey, a male was seen in the act of opening a ripe wild orange (china) and eating the pulp and juice. On half a dozen wild trees near here 30 oranges had been attacked in the same way. The bird occurs in cultivated groves, but was not seen to do any damage. Its work is unmistakable, as it tears a large opening in the fruit from which to extract the pulp, choosing only the ripest fruit.

These birds are frequently infested with a species of parasitic grub, which, however, in most cases does not appear to affect their vitality seriously. The parasites are found usually on the breast just under the skin, though sometimes they occur on the abdomen and underside of the wings. One bird had about 30 of the grubs, but this was exceptional, 2 or 3 being the usual number. The birds were observed in the field eating the following fruits and berries, besides those that have been mentioned: Pomarosa (*Jambosa jambos*), camacey (*Miconia racemosa*), palo de perico (*Cordia corymbosa*), palo moro (*Psychotria brachiata*), a wild fig (*Ficus lævigata*), and a parcha (*Passiflora sexflora*).

Food.—Animal matter occurred in only 2 of the 96 stomachs of the spindalis examined and in each case consisted of fragments of a coffee leaf-weevil (*Lachnopus* sp.). The other stomachs were filled entirely with seeds and bits of the skin of the various wild fruits and berries in season at the time the birds were collected. No sand or gravel was found, and evidently the seeds pass through the large alimentary canal after the soft matter has been removed, or if the seeds are soft they are completely digested. None of the fruits or berries enumerated below has any economic value nor is the dissemination of their seeds of any importance. These birds are the great seed-distributing agencies of the island and to them are largely due the growths of shrubs which cover waste lands, especially in the interior.

Where these birds are found doing serious damage they may properly be destroyed, but damage by them is believed to be rare. Cultivated oranges for the market are picked and shipped before they are ripe enough to be attacked, so that the depredations of the spindalis are confined entirely to wild fruit. Very little is destroyed, considering the large quantities of chinas growing in a wild state. No trace of coffee berries was found in any of the stomachs. This species may be regarded as harmless and of no economic importance. Its beauty should insure its protection unless it is actually found destroying valuable fruit.

A list of identified wild fruits and berries found in stomachs follows:

Wild fig (*Ficus* sp.)	21	Storax (*Styrax* sp.)	1
Amaranth (*Amaranthus* sp.)	2	Nightshade (*Solanum* sp.)	7
Fresa (*Rubus* sp.)	4	Moral (*Cordia* sp.)	2
Icaco (*Chrysobalanus pellocarpa*)	1	Moral (*Cordia nitida*)	1
Spurge (*Chæmesyce* sp.)	1	Moral (*Cordia corymbosa*)	2
Rhacoma (*Rhacoma crossopetalum*)	1	Sapalo (*Palicourea riparia*)	2
Gia (*Casearia* sp.)	1	Roble guayo (*Bourreria* sp.)	1
Camacey (*Miconia* sp.)	4	Tantillo (*Randia aculeata*)	1
Camacey (*Miconia prasina*)	16	Palo moro (*Psychotria brachiata*)	1
Murta (*Eugenia* sp.)	1	Pendulo (*Citharexylum fruticosum*)	3

PORTO RICAN EUPHONIA. *Tanagra sclateri* (Sundevall).
CANARIO DEL PAIS, JILGUERO, JILGUERO DEL PAIS, CANARIO CRIOLLO.

The euphonia is a tolerably common resident in Porto Rico, but is found only in the hills and not in the coastal plain. It associates in pairs or small flocks and frequents forests and coffee plantations. In the tree tops these little tanagers are rather active, hopping quickly about, and calling *wheur* and a sharp *chit-it.* These notes are rather ventriloquial, but when heard the bird may soon be discovered in the nearest clumps of capitana (*Phoradendron* sp.), the seeds of which form its food. Certain growths with an abundance of ripe berries are visited time after time. The birds usually keep in the thickest parts of the clumps and are rather hard to distinguish from honey creepers. They are at times rather shy, and then fly for considerable distances with a bounding flight.

These birds were in pairs in January and were nesting by the last of February. Young birds were taken May 17 near Yauco, and were common until the first week in July. By August 10 many adults had completed the molt. The males have a low song consisting of the rapid repetition of a single metallic phrase, preceded by louder explosive notes, with twittering interpolations. For this and their bright colors they are prized greatly as cage birds, and about Ponce and Juana Diaz bird catching is a regular occupation with the boys, and the birds are offered in the markets for 5 and 10 cents apiece. In catching them, a bird, usually a female, is shut up in a wicker cage, and a convenient perch or the top of the cage smeared with bird lime. The cage is then placed in a bush, and the captive whistles loudly, calling down the others; or the bird catcher holds the cage in his hand, up toward the trees, where the free birds hop about excitedly calling and whistling loudly. The crate is then moved rapidly back and forth or carried away, the boy running quickly, when the notes of the captive, as it jostles about inside, prove too much for the others, and they fly down. Once they alight, their fate is sealed, and in a few minutes they are inside the cage, themselves captive. In captivity the food is almost entirely ripe bananas and the birds appear to thrive on this diet.

Food.—Fifty-one stomachs of this tanager were examined and in them nothing but the seeds of mistletoe, known as capitana, was found, from 2 to 20 occurring in each stomach. These seeds are small, coated with a thick, transparent, viscous fluid, and are inclosed in an outer envelope. In feeding the berry is broken and the inner portion swallowed, the outer covering being discarded. In dissecting the tanagers the seeds and viscous matter found in the lower part of the intestines were in the same condition apparently as those which remained in the throat, though the nutritive matter had been removed by digestion (Wetmore 1914a). The birds, then, act as distributors of their favorite food, the gelatinous strings supporting the seeds after passing through the alimentary canal catching and lodging on the limbs of the trees and producing new plants. It was noticeable that the mistletoe was very abundant in the dry region of the south coast, as the seeds here were less liable to be washed to the ground before the heat could dry them and fasten them to the limbs than they were in regions of copious rainfall. Though mistletoe is considered injurious where it is abundant enough to kill the trees so unfortunate as to act as hosts, no complaint was made of it in Porto Rico nor could any damage be attributed ot it. It grew commonly in trees serving as shade for the coffee, but no attempt was made to cut it out or keep it down. Infested trees were apparently healthy. The birds are very active and at times I was led to believe that they were capturing insects, but no trace of such food was found in the stomachs examined.

Under present conditions the euphonia has no economic importance and is harmless. It is much prized as a cage bird on the south side of the island and many are trapped. There is no need of restricting this practice when carried on humanely, as the birds, although hunted for this purpose for many years, hold their own. Furthermore, it may be said that these little tanagers thrive and appear happy in captivity, becoming tame and confiding, and bringing enjoyment to many.

Mistletoe, or capitana, seeds of the following species were identified in the stomachs examined:

Phoradendron quadrangulare	9	*Phoradendron chrysocarpum*	29
Phoradendron latifolium	18	*Phoradendron* sp	1

PORTO RICAN GROSBEAK. *Loxigilla portoricensis* (Daudin).
GALLITO, CHURRI, CAPITAN, COME GANDUL.

The grosbeak is a common resident in Porto Rico, occurring along the coast only when there is dense brush, but found through the hills inland. It is seemingly absent or very rare in the eastern third of the island. The birds are shy and are observed often in coffee plantations feeding on the ground. Only occasionally, in little-frequented localities, do they feed in the open. The flight is quick and tilting, and the birds often dodge across from one patch of cover to the next. The males fly into the tops of trees, and, keeping concealed in the leaves, sing a loud cardinal-like song. But for the number heard singing, one would consider them rare, so well do they keep hidden. This is one of the few birds of Porto Rico that sing constantly, so that its song is all the more welcome. The ordinary call note is a low *tsweet.* These birds nest rather irregularly throughout the year, the main nesting period, however, being from February to the last of June. One nest was seen near Salinas on a horizontal limb about 30 feet from the ground. One found June 26, near Lares, was in the top of an inclined coffee tree, about 5 feet from the ground, and though it was large and bulky it was almost entirely concealed. The foundation was of dried banana leaves, and above these sticks, grass, and weed stems were built up, forming a deep cup, lined with grass and rootlets. This nest contained three greenish eggs, spotted and blotched with brown. The young of this species pair as soon as full grown and often before they are in fully adult plumage. The young are most abundant in July and August. The adults are molting then and have almost ceased to sing.

At Lares it was believed that this bird was responsible for much of the damage done to the coffee crop in stripping the berries of the sweet outer pulp, but this I failed to substantiate by actual observation. These birds were sometimes seen scratching in the leaves in dense shrubbery for food. It was surprising to see how well their black color protected them in the dense shadows; only when in motion could the form of the birds be made out, even though close by. They were observed eating the fruit of the following: Icaco (*Chrysobalanus* sp.), manzanillo (*Hippomane manchinella*), pomarosa (*Jambosa jambos*), and sapalo (*Palicourea riparia*).

Food.—The stomachs of 26 of these birds were examined, collected every month from December to August except March. The animal content comprises 29.89 per cent and the vegetable 70.11 per cent. Though animal food was found in every stomach, the quantity was small in some cases, the main dependence for sustenance being upon vegetable matter.

Orthopterous eggs (1.17 per cent) were found in two stomachs taken in December and January. Scarred-snout beetles came to 9.57 per cent, and in three cases were the cane root-boring weevil (*Diaprepes spengleri*) and in five consisted of fragments of coffee leaf-weevils (*Lachnopus* sp.). Miscellaneous weevil remains in eight instances came to 4.57 per cent. With the powerful bill of this grosbeak the insects eaten were ground up into very small fragments so that they were hard to recognize. Fragments of other beetles (10.42 per cent) were found in 12 stomachs, and among them a buprestid (*Acmœodera* sp.) and a *Cryptocephalus* were identified. Caterpillars (3.07 per cent) were eaten twice. Spiders, found only once, amount to 0.16 per cent. Miscellaneous animal matter, including bits of snail shell, a neuropteran, and a scale insect (*Lecanium* sp.), constitute 0.93 per cent.

Though a few grass seeds are eaten, most of the seeds found in these stomachs are those of wild berries and small fruits, none of any value to man. As much gravel is eaten, the seeds in most cases are ground up and digested, as well as the pulp surrounding them. These stomachs were examined carefully for remains of coffee berries, but no trace of them was found, and from the data available the bird is to be considered beneficial. Though animal food forms slightly less than one-third of the bulk, it is composed almost entirely of injurious insects of considerable importance to agriculture. It may be that this grosbeak feeds at times on coffee or small garden legumes, but few complaints were heard, so that the habit, if practiced, seems to be infrequent.

A list of identified seeds follows:

Paspalum (*Paspalum* sp.)	5	Espino (*Xanthoxylum* sp.)	3
Paspalum (*Paspalum millegrama*)	2	Camacey (*Miconia* sp.)	5
Fimbristylis (*Fimbristylis* sp.)	3	Ajì (*Capsicum* sp.)	5
Whitetop (*Dichromena ciliata*)	2	Moral (*Cordia* sp.)	3
Star grass (*Hypoxis* sp.)	3	Palo moro (*Psychotria brachiata*)	1
Vetch (*Vicia* sp.)	1		

CARIB GRASSQUIT. *Tiaris bicolor omissa* (Jardine).

CHAMORRO, GORRION, CHAMORRO BICOLOR.

The Carib grassquit is an abundant resident in Porto Rico, especially so on the dry south coast. Except at Mameyes and Aibonito, it greatly outnumbered the other species of grassquit. These birds occur wherever there is any cover for them in the cane fields, the maya hedges, thickets, coffee plantations, or second-growth forest. They are tame, unsuspicious little birds, that are found in pairs and sometimes in small flocks. In riding through the cane fields at dusk they were continually fluttering along ahead, so that the cane was full of their rustlings. They were found often working through the trees in various localities, searching through the limbs exactly like honey creepers, and there were so many in the open fields that it was surprising to find them at home in the dense second growth of the forest.

The breeding season appears to extend well through the year, fully fledged young being observed from January to June, and breeding birds were taken in every month in which I collected. Loose flocks, mainly young birds, were encountered all through the year while the adults were in pairs and nesting. Nests were located in maya hedges, or bushes, only a foot or so from the ground, and were always concealed. One found in a coffee plantation near

Yauco May 21 was in the midst of a thick bush about 3 feet from the ground and was made of grass and weed stalks, arched over, with a rough opening at one side. The cup within that contained the eggs was made of very soft, fine grasses, and the eggs were four in number, whitish, heavily marked with cinnamon, and lined somewhat with black.

The males sang all day long from a post, weed, telephone wire, or other open perch, a harsh emphatic little song that reminded me of a dickcissel. In flying they frequently changed to a slow direct flight, with trembling wings, and head thrown back, and sang until another perch was reached. The call note is a low *tseet.*

Food.—Seventy-two stomachs of this small finch were examined, collected in the months from December to September, inclusive, and in these animal food was found in five birds only. The species is almost entirely granivorous in its diet, the animal food coming to a very small percentage of the bulk. Two stomachs contained very slight remains, one of a small homopteran and the other of a spider. One had eaten 11 small caterpillars and 2 roaches, another 4 leaf hoppers, and a third a small caterpillar and a spider.

Seeds of all kinds of grasses and sedge are eaten eagerly and ground up in the muscular gizzard with sand taken for that purpose. They are usually swallowed entire, but occasionally were first neatly hulled. Some of these, as the crab grass (*Syntherisma sanguinalis*), are noxious species abundant in cultivated fields. Other weed seeds of importance as pests also are consumed, as the purslane (*Portulaca oleracea*) and pigweed (*Amaranthus* sp.). Though the bird is accused of eating tobacco seeds left in the fields for seed, no trace of them was found and a bird shot in such a field near Comerio had taken only grass seeds.

This grassquit is entirely harmless and does some good in destroying the seeds of noxious weeds and a few harmful insects, so that it is worthy of a place on the protected list.

A list of seeds identified in these stomachs follows:

Paspalum (*Paspalum millegrama*)	24
Paspalum (*Paspalum* sp.)	1
Crab grass (*Syntherisma sanguinalis*)	16
Panic grass (*Panicum* sp.)	7
Malojillo (*Panicum fasciculatum*)	20
Smut grass (*Sporobolus indicus*)	8
Ichnanthus (*Ichnanthus pallens*)	5
Chloris (*Chloris radiata*)	2
Egyptian grass (*Dactyloctenium œgypticum*)	10
Fimbristylis (*Fimbristylis* sp.)	5
Sedge (*Carex* sp.)	3
Star grass (*Hypoxis* sp.)	18
Amaranth (*Achyranthes indica*)	1
Verdolaguilla (*Talinum paniculatum*)	1
Purslane (*Portulaca oleracea*)	10
Amaranth (*Amaranthus* sp.)	12
Vinagrillo (*Oxalis* sp.)	1
Espino (*Xanthoxylum* sp.)	1
Nightshade (*Solanum* sp.)	1

BRYANT'S GRASSQUIT. *Tiaris olivacea bryanti* (Ridgway).

GORRION, CHAMORRO, CHAMORRO BELLO.

Bryant's grassquit is a common resident on Porto Rico and Vieques, but rare on Culebra Island. This species is found entirely in the open, in pastures and cultivated fields, following the maya hedges or scanty growths of bushes. It never goes into the dense thickets, as the other grassquit (*T. b. omissa*) does. Small marshes covered with high grass are favorite localities and in brushy pastures, where the grass is long, the birds are common. They occur all through the year in small flocks, sometimes merely a family group, or again 15 or 20 individuals together. When flushed they fly with an undulating flight to the nearest maya hedge or thicket, and then work rapidly away, or if not further disturbed drop down again to the ground and continue feeding. In the cane fields they retreat before the men advancing in cutting the crop, and concentrate in pastures and hedges, ready to scatter again over the fields when the new crop is large enough to shelter them. Gundlach (1878, p. 204) says that in his time they came about the crude sugar mills then in operation to eat the sugar as it was manufactured.

The males sing all day long from some elevated perch an insectlike trill which can not be heard at any distance, and the ordinary call note is a faint *tseep.*

The breeding season apparently extends through the entire year. The greater number of the birds nest low down, usually in the grass on the edge of a ditch or depression or in grassy fields. The nest is a ball made of fine grasses, with an entrance in one side. One found near the Hacienda Catalina March 4 contained three eggs, white with a greenish tinge, spotted with cinnamon brown, the spots forming a slight wreath about the large end of the egg. Young birds were noted through the entire year.

Food.—Of 65 birds examined only 1 had eaten insect matter, and this had picked up 8 spiders and a leaf hopper (*Tettigonia* sp.). The great bulk of the food consists of grass seeds, some of species regarded as weeds, as the crab grass (*Syntherisma sanguinalis*), seeds of which were found in 23 stomachs. All the common species of grasses are represented, and besides these a few seeds of a sedge (*Fimbristylis* sp.) and star grass (*Hypoxis* sp.) were found. This grassquit is entirely harmless, and though practically no insects are taken it destroys many seeds of injurious weeds, so that it should be protected.

A list of seeds identified in these stomachs follows:

Paspalum (*Paspalum millegrama*)	27	Smut grass (*Sporobolus indicus*)	3
Paspalum (*Paspalum* sp.)	9	Ichnanthus (*Ichnanthus pallens*)	16
Crab grass (*Syntherisma sanguinalis*)	23	Chloris (*Chloris radiata*)	4
Malojillo (*Panicum fasciculatum*)	8	Fimbristylis (*Fimbristylis* sp.)	9
Panic grass (*Panicum* sp.)	8	Star grass (*Hypoxis* sp.)	14

SANTO DOMINGAN GRASSHOPPER SPARROW. *Coturniculus savannarum intricatus* Hartert.

GORRION, CHAMORRO.

The grasshopper sparrow is resident in Porto Rico, but now found apparently in only a few localities. A colony of 35 or more was located near Yabucoa May 10. It was common north of Cabo Rojo August 24 to 31, and was frequently seen along the Bayamon River near Bayamon July 20 to 25. This species would seem, then, to occur only in the lowlands, though there is in the United States National Museum one specimen from Caguas. Bowdish (1902–3, p. 13) records it as fairly common near San Juan, Aguadilla, and Mayagüez in the period from 1899 to 1901. A series of birds collected belong to this subspecies (described by Hartert from El Valle, Santo Domingo). They are found only in open pastures where the grass grows high enough to afford shelter, or on waste land, as the gravel bars along the Bayamon River. As more and more of these areas are broken up and cultivated the birds will become rarer.

This is a very inconspicuous species and one easily overlooked. In passing through their haunts they are seen merely to skulk to one side in the grass or fly up just behind one, and after a short, rather weak flight drop back again into cover. On the ground they creep along through the grass, or hop when it is more open, stretching up their heads and flirting their tails nervously. The song of the males is a weak effort that may be represented by the syllables *tsick tsee—ee—ee—ee,* the first syllable sharp and quick and the last insectlike. The song is very ventriloquial, the first part seeming to come from one side and last from another. The birds sing from a weed top a foot or more above the ground, and by inspecting these closely the sparrows may be located after a few minutes. They sing occasionally even as late as August, but not so much as earlier in the summer.

They nest from May to August (Bowdish records a nest at Aguadilla June 16, 1900), and it would appear that two broods are raised. Their ground-haunting habits and nests lay them open to attacks of the mongoose and doubtless many are destroyed. The last of July, near Bayamon, one immature bird in fresh fall plumage was taken, but most of the young were then in juvenile dress. The adults were very worn at that time, some of them having the rectrices much abraded or even broken, but they were not molting. Here another song was heard, a series of low twittering notes, even harder to locate than the other, while the call note was a scolding *tsip*. The young birds, now shifting for themselves, were common along the gravel bars in the stream, sometimes perching, two or three together, in low weeds, and acting more curious than afraid.

Food.—Thirty-two stomachs of the grasshopper sparrow were at hand for examination, collected in May, July, and August. Animal food forms 65.9 per cent and vegetable 34.1 per cent, these figures corresponding very closely to what is known of the food of allied subspecies in the north. Orthoptera, Lepidoptera, and Coleoptera form the bulk of the animal food and seeds of grass and other plants compose the vegetable portion.

Animal food.—Two birds had eaten nymphs of the mole cricket (0.25 per cent), and crickets seem to be favorite food, as they were found in seven stomachs, and at Bayamon a female was feeding a large cricket (*Anurogryllus muticus*) to her young. Grasshoppers were noticed in four stomachs and Orthoptera as a whole occurred in 17 birds, constituting 24.82 per cent of the total. Lantern flies were eaten seven times and come to 1.28 per cent and other Homoptera, all small species, to 1.48 per cent. Stinkbugs in four instances and a few fragments of other bugs constitute 3.75 per cent. Leaf beetles (5.3 per cent) were favorites with the grasshopper sparrow and many were eaten. A striped flea-beetle (*Systena basalis*), a species destructive to all small garden crops and vegetables, was found in 12 stomachs. A tortoise beetle was taken twice, a bean leaf-beetle (*Cerotoma denticornis*) once, and a *Diabrotica* once. Scarred-snout beetles (0.87 per cent) were eaten four times and include one cane root-borer (*Diaprepes spengleri*). Curculios amount to 2.25 per cent and miscellaneous weevil remains to 0.25 per cent. Small fragments of other Coleoptera total 0.97 per cent. One carabid was eaten. All of these hard-shelled insects were very finely ground in the stomachs of this bird.

Remains of Hymenoptera (1.33 per cent) were in nine instances those of ants, and in two the fragments of small parasitic species. Twenty-one birds had eaten caterpillars, and one a moth, all coming to 14.8 per cent. Spider remains in eight stomachs amount to 7.75 per cent, and other animal matter, bits of a snail, insect eggs, and unidentified material, come to 0.8 per cent.

A list of identified animal matter follows:

ORTHOPTERA.	
Scapteriscus didactylus	2
HEMIPTERA.	
Ormenis sp	2
Corixa sp	2
COLEOPTERA.	
Cerotoma denticornis	1
Diabrotica graminea	1
COLEOPTERA—continued.	
Systena basalis	12
Coptocycla signifera	2
Platydema sp	2
Diaprepes spengleri	1
Lachnopus sp	1
Euscepes porcellus	1
HYMENOPTERA.	
Solenopsis geminata	2
Pheidole subarmata borinquensis	1

Vegetable food.—Vegetable matter was found in all but 2 of the stomachs examined, most of it in 20 stomachs collected in July, when it comes to 46.7 per cent. This matter consists entirely of seeds, largely those of grasses, with a few sedges and miscellaneous weed seeds. Some of the species taken are notorious weeds. These are all ground up in the strong stomachs and digested with the aid of sand.

A list of identified seeds is given below:

Paspalum (*Paspalum millegrama*)	11	Whitetop (*Dichromena ciliata*)	2
Paspalum (*Paspalum* sp.)	1	Sedge (*Carex* sp.)	1
Crab grass (*Syntherisma sanguinalis*)	4	Star grass (*Hypoxis sp.*)	8
Malojillo (*Panicum fasciculatum*)	8	Amaranth (*Amaranthus* sp.)	5
Panic grass (*Panicum* sp.)	3	Purslane (*Portulaca oleracea*)	4
Smut grass (*Sporobolus indicus*)	2	Vetch (*Vicia* sp.)	2
Ichnanthus (*Ichnanthus pallens*)	1	Verdolaguilla (*Oxalis* sp.)	1
Egyptian grass (*Dactyloctenium ægypticum*)	1		

Summary.—No evil can be attributed to the grasshopper sparrow, and it is to be regretted that it is not so abundant as the ever-present grassquits. Orthoptera, including a small number of mole crickets, form one-fourth of the food, and besides large numbers of weevils and caterpillars are eaten. In 32 stomachs only one beneficial beetle and two parasitic chalcids were found, while spiders were eaten in small quantity. The remainder of the animal food was composed entirely of injurious insects of great economic importance. Some of the seeds eaten are those of noxious weeds, and none of any actual value, so that this element in its food also adds to the usefulness of the bird. Though few in number, it is a species of considerable importance to the island.

[**RED SISKIN.** *Spinus cucullatus* (Swainson).
DOMINIQUITO.

Sundevall (1869, p. 597) includes the red siskin in his list as received from Hjalmarson, and on this is based the belief that this siskin has been naturalized in Porto Rico. Gundlach, however (1878a, pp. 174–175), says that Hjalmarson assured him his specimen was a cage bird, so that the siskin has no status as a Porto Rican bird and is included here merely to correct the many statements that it has been found on the island in a wild state.]

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